Installation Instructions

Log wood boiler S1 Turbo

Translation of the original German installation instructions for technicians

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

M1470113_en | Edition 02/09/2013

CE

Froling GesmbH | A-4710 Grieskirchen, Industriestraße 12 | www.froeling.com

Table of Contents

1	General	4
2	Safety	5
2.1	Hazard levels of warnings	5
2.2	Qualification of assembly staff	6
2.3	Protective equipment for assembly staff	6
2.4	Design Information	7
2.4.1	Notes on standards	7
	General standards for heating systems	7
	Standards for structural and safety devices	7
	Standards for heating water	7
	Standards for permitted fuels	8
2.4.2	Installation and approval of the heating system	8
2.4.3	General information for installation room (boiler room)	8
2.4.4	Requirements for central heating water	9
2.4.5	Notes for using pressure maintenance systems	9
2.4.6	Return lift	10
2.4.7	Combination with storage tank	11
2.4.8	Chimney connection/chimney system	13
	Draught limiter	13
	Boiler data for planning the flue gas system	13
3	Technology	14
3.1	Dimensions	14
3.2	Components and connections	15
3.3	Technical specifications	16
4	Assembly	18
4.1	Materials supplied	18
4.1.1	Tools required	18
4.2	Positioning	18
4.3	Temporary storage	19
4.4	Setting up in the boiler room	19
4.4.1	Removing boiler from pallet	19
4.4.2	Minimum distances in the boiler room	20
4.5	Before Installation	21
4.5.1	Changing the stop of the fuel loading door and the combustion chamber door	21
4.5.2	Checking the seal on the doors	24
4.5.3	Positioning the doors	25
4.6	Installing the boiler	26
4.6.1	Assembly overview	26
4.6.2	Installing the induced draught fan	28
4.6.3	Installing the insulation	28
4.6.4	Fitting the air control	32
	Variant 1 - Fitting the servo-motor	32
	Variant 2 - Fitting the manual controller	33
4.6.5	Fitting the controller box	34
4.6.6	Fitting the broadband probe, flue gas temperature sensor and STL	36

4.6.7 Attaching the induced draught cable 37
4.6.8 Installing the insulated door 37
4.7 Electrical connection and wiring 40
4.7.1 Information on circulating pumps 40
4.7.2 Concluding work 41
4.8 Connecting the hydraulic safety devices 43
4.9 Installing the WOS system (optional) 44
5 Start-up 49
5.1 Before commissioning / configuring the boiler 49
5.2 Initial startup 50
5.2.1 Permitted fuels 50
Firewood 50
5.2.2 Fuels permitted under certain conditions 51
Wood briquettes 51
5.2.3 Non-permitted fuels 52
5.2.4 Heating up for the first time 53
Boiler with Lambda control 53
Boiler with manual controller 53
6 Decommissioning 56
6.1 Mothballing 56
6.2 Disassembly 56
6.3 Disposal 56
7 Appendix 57
7.1 Pressure equipment regulation 57
7.2 Technical specifications - Lambda control with partial load values 58
7.3 Addresses 59
7.3.1 Address of manufacturer 59
7.3.2 Address of the installer 59

USER MANUAL FOR BATCH FED INDEPENDENT WOOD LOG FIRED BOILERS

SUPPLEMENTARY INSTALLATION INSTRUCTIONS FOR THE UK MARKET TO BE READ IN CONJUNCTION WITH THOSE IN THE INSTRUCTION BOOKLET

READ THE INSTRUCTION BOOKLET AND THESE SUPPLEMENTARY INSTRUCTIONS CAREFULLY BEFORE INSTALLATION

These instructions together with those in the instruction booklet cover the basic principles to ensure the satisfactory installation of the boiler, although detail may need slight modification to suit particular local site conditions.
In all cases the installation must comply with current Building Regulations, Local Authority Byelaws and other specifications or regulations as they affect the installation of the boiler.
If any guidance contained within this manual contradicts advice given in the main manufacturer's instruction manual then the most stringent advice must apply.
It should be noted that the Building Regulations requirements may be met by adopting the relevant recommendations given in British Standards BS 8303, BS EN 15287-1:2007 as an alternative means to achieve an equivalent level of performance to that obtained following the guidance given in Approved Document J.

Please note that it is a legal requirement under England and Wales Building Regulations that the installation of the boiler is either carried out under Local Authority Building Control approval or is installed by a Competent Person registered with a Government approved Competent Persons Scheme. HETAS Ltd operate such a Scheme and a listing of their Registered Competent Persons can be found on their website at www.hetas.co.uk.

CO Alarms:-

Building regulations require that whenever a new or replacement fixed solid fuel or wood/biomass appliance is installed in a dwelling a carbon monoxide alarm must be fitted in the same room as the appliance. Further guidance on the installation of the carbon monoxide alarm is available in BS EN 50292:2002 and from the alarm manufacturer's instructions. Provision of an alarm must not be considered a substitute for either installing the appliance correctly or ensuring regular servicing and maintenance of the appliance and chimney system.

HEALTH AND SAFETY PRECAUTIONS

Special care must be taken when installing the boiler such that the requirements of the Health and Safety at Work Act (1974) are met.

Handling

Adequate facilities must be available for loading, unloading and site handling.

Fire Cement

Some types of fire cement are caustic and should not be allowed to come into contact with the skin. In case of contact wash immediately with plenty of water.

Asbestos

This boiler contains no asbestos. If there is a possibility of disturbing any asbestos in the course of installation then please seek specialist guidance and use appropriate protective equipment.

Metal Parts

When installing or servicing this boiler care should be taken to avoid the possibility of personal injury.

BOILER PERFORMANCE

Refer to the main instruction manual for details of the boiler's performance.

PREPARATORY WORK AND SAFETY CHECKS

IMPORTANT WARNING

This boiler must not be installed into a chimney that serves any other heating appliance.

There must not be an extractor fan fitted in the same room as the boiler as this can cause the boiler to emit fumes into the room.

Chimney

In order for the boiler to perform satisfactorily the chimney height must be sufficient to ensure an adequate draught of approximately 15 Pa so as to clear the products of combustion and prevent smoke problems into the room.

NOTE: A chimney height of not less than 4.5 metres measured vertically from the outlet of the boiler to the top of the chimney should be satisfactory. Alternatively the calculation procedure given in EN 13384-1 may be used as the basis for deciding whether a particular chimney design will provide sufficient draught.

The outlet from the chimney should be above the roof of the building in accordance with the provisions of Building Regulations Approved Document J.

Because the boiler runs at high efficiencies, the temperature of the flue gases is at times lower than conventional solid fuel appliances. Although it is not classed as a condensing appliance, the low flue gas temperature results in condensation occurring within the flue. Any chimney flue system must therefore be able to withstand the effects of condensate and operate under wet conditions (designation letter W). In addition it should be soot fire resistant and able to withstand the corrosive effects of flue products generated by solid fuels (designation G and 3 respectively). If installation is into an existing masonry chimney then it will require re-lining with a liner meeting the specification described above. Existing concrete or clay lined chimneys are not suitable for this boiler and must be lined as described above. All installations must be in accordance with Building Regulations Approved Document J.

Any existing chimney must be clear of obstruction and have been swept clean immediately before installation of the lining system. Where the chimney is believed to have previously served an open fire installation it is possible that the higher flue gas temperature from a closed appliance may loosen deposits that were previously firmly adhered, with the consequent risk of flue blockage. It is therefore recommended that the chimney be swept a second time within a month of regular use after installation.

If there is no existing chimney then any new system must be to the designation described above and in accordance with Building Regulations Approved Document J.

A single wall metal fluepipe is suitable for connecting the boiler to the chimney but is not suitable for use as the complete chimney. The chimney and connecting fluepipe must have a minimum diameter of 150 mm and its dimension should be not less than the size of the outlet socket of the boiler.

Any bend in the chimney or connecting fluepipe should not exceed 45°. 90° bends should not be used.

Combustible material should not be located where the heat dissipating through the walls of fireplaces or flues could ignite it. Therefore when installing the boiler in the presence of combustible materials due account

must be taken of the guidance on the separation of combustible material given in Building Regulations Approved Document J and also in these boiler instructions.

If it is found that there is excessive draught in the chimney then a draught stabiliser should be fitted in the chimney above the chimney above the flue pipe connection. Fitting of a draught stabiliser will affect the requirement for the permanent air supply into the room in which the boiler is fitted in accordance with Approved Document J (see also combustion air supply).

Adequate provision e.g. easily accessible soot door or doors must be provided for sweeping the chimney and connecting fluepipe.

Hearth

The hearth should be able to accommodate the weight of the boiler and its chimney if the chimney is not independently supported. The weight of the boiler is indicated in the brochure.

The boiler should preferably be installed on a non-combustible hearth of a size and construction that is in accordance with the provisions of the current Building Regulations Approved Document J.

The clearance distances to combustible material beneath, surrounding or upon the hearth and walls adjacent to the hearth should comply with the guidance on the separation of combustible material given in Building Regulations Approved Document J and also in these boiler instructions.

If the boiler is to be installed on a combustible floor surface, it must be covered with a non-combustible material at least 12mm thick, in accordance with Building Regulations Approved Document J, to a distance of 30 cm in front of the boiler and 15 cm to each side measuring from the door of the combustion chamber.

Combustion air supply

In order for the boiler to perform efficiently and safely there must be an adequate air supply into the room in which the boiler is installed to provide combustion air. The provision of air supply to the boiler must be in accordance with current Building Regulations Approved Document J. An opening window is not appropriate for this purpose.

Connection to chimney

All boilers have a flue gas connector that allows connection to either a masonry chimney or a prefabricated factory made insulated metal chimney in accordance with the instructions. This connection should never be reduced in diameter to lower than that of the flue gas connector of the boiler. In some cases it may be necessary to fit an adapter in the connection pipe to increase the diameter to the required minimum diameter of 150 mm for burning wood fuel in accordance with UK regulations. Any connections should be made gas-tight and sealed with a suitable sealing agent such as fire cement.

Connection to the central heating system

The boilers may be installed on either open vented or sealed fully pumped systems. The water system must be properly vented and a double-feed indirect cylinder to the current specification in issue BS 1566 Part 1 for double indirect cylinders is necessary where there is a combined hot water and central heating system.

During installation caution must be made on the need for a gravity heat-leak radiator or towel rail to dissipate heat when the pump is off and the minimum load for this function.

The central heating system must be in accordance with BS EN 14336:2004: Heating Systems in Buildings. Installation and commissioning of water based heating systems. BS EN 12828: 2003; Heating Systems in Buildings. Design of water based heating systems. BS EN 12831: 2003; Heating Systems in Buildings. Method for calculation of the design heat load and BS 6880:1988 Parts 1 to 3, Code of Practice for low temperature hot water heating systems of output greater than 45kW where appropriate.
A correctly sized accumulator tank must be fitted to the system in order to dissipate heat from the appliance during use.

Electrical connections

The installation of any electrical services during the installation of this boiler and the associated heating system must be carried out by a registered competent electrician and in accordance with the requirements of the latest issue of BS 7671.

Commissioning and handover

Ensure all parts are fitted in accordance with the instructions.

On completion of the installation allow a suitable period of time for any fire cement and mortar to dry out, before lighting the boiler. Once the boiler is under fire check all seals for soundness and that the boiler and water system are operating correctly. Ensure that the flue is functioning correctly and that all products of combustion are vented safely to atmosphere via the chimney terminal.

On completion of the installation and commissioning ensure that the operating instructions for the boiler are left with the customer. Ensure to advise the customer on the correct use of the appliance and warn them to use only the recommended fuel for the boiler.

Advise the user what to do should smoke or fumes be emitted from the boiler. The customer should be advised about restricting access to the boiler by children, aged and/or infirm people.

1 General

Thank you for choosing a quality product from Froling. The product features a state-of-the-art design and conforms to all currently applicable standards and testing guidelines.

Please read and observe the documentation provided and always keep it close to the system for reference. It contains important safety information and all the operation and maintenance specifications needed to operate the system safely, properly, environmentally friendly and cost-effectively.

The constant further development of our products means that there may be minor differences from the pictures and content. If you discover any errors, please let us know: doku@froeling.com

Subject to technical change.

Issuing a delivery certificate

The EC Declaration of Conformity is only valid in conjunction with a delivery certificate, which has been filled in correctly and signed as part of the commissioning process. The original document remains at the installation site. Commissioning installers or heating engineers are requested to return a copy of the delivery certificate together with the guarantee card to Froling. On commissioning by FROLING Customer Service the validity of the delivery certificate will be noted on the customer service record.

2 Safety

2.1 Hazard levels of warnings

This documentation uses warnings with the following hazard levels to indicate direct hazards and important safety instructions:

⚠ DANGER

The dangerous situation is imminent and if measures are not observed it will lead to serious injury or death. You must follow the instructions!

⚠ WARNING

The dangerous situation may occur and if measures are not observed it will lead to serious injury or death. Work with extreme care.

⚠ CAUTION

The dangerous situation may occur and if measures are not observed it will lead to minor injuries or damage to property.

2.2 Qualification of assembly staff

⚠ CAUTION

Assembly and installation by untrained personnel:

Risk of personal injury and damage to property.

During assembly and installation:

❒ Observe the instructions and information in the manuals

❒ Only allow trained staff to carry out assembly and installation

Assembly, installation, initial startup and servicing must always be carried out by qualified personnel:

- Heating technician / building technician
- Electrical installation technician
- Froling customer services

The assembly staff must have read and understood the instructions in the documentation.

2.3 Protective equipment for assembly staff

You must ensure that staff have the protective equipment specified by accident prevention regulations.

▪ For transportation, setup and assembly:
- suitable workwear
- protective gloves
- sturdy shoes

2.4 Design Information

2.4.1 Notes on standards

The system must be installed and commissioned in accordance with the local fire and building regulations. The following standards and regulations should always be observed:

General standards for heating systems

EN 303-5	Boilers for solid fuels, manually and automatically fed combustion systems, nominal output up to 300 kW
EN 12828	Heating systems in buildings - Design of water-based heating systems
EN 13384-1	Chimneys - Thermal and fluid dynamic calculation methods Part 1: Chimneys serving one appliance
ÖNORM M 7510-1	Guidelines for checking central heating systems Part 1: General requirements and one-off inspections
ÖNORM M 7510-4	Guidelines for checking central heating systems Part 4: Simple check for heating plants for solid fuels

Standards for structural and safety devices

ÖNORM H 5170	Heating installation - Requirements for construction and safety engineering, as well as fire prevention and environmental protection

Standards for heating water

ÖNORM H 5195-1	Prevention of damage by corrosion and scale formation in closed warm water heating systems at operating temperatures up to 100 °C (Austria).
VDI 2035 Sheet 1	Prevention of damage in water heating systems - Scale formation in domestic water heating systems and hot water heating systems (Germany)
SWKI 97-1	Water quality for heating, steam, cooling and air conditioning systems (Switzerland)
D.P.R. no. 412	Regulations for the planning, installation, running/operation and maintenance of heating systems in buildings to reduce energy consumption with reference to Article 4, Comma 4 of the Legislative Decree of 9 January 1991, No. 10 (Italy)

Standards for permitted fuels

EN 14961-3	Solid bio-fuel - Fuel specifications and classes Part 2: Wood briquettes for non-industrial use
EN 14961-5	Solid bio-fuel - Fuel specifications and classes Part 5: Firewood for non-industrial use
1. BImSchV	First Ordinance of the German Federal Government for implementation of the Federal Emission Protection Law, BGBl. I P. 491, in the applicable version.

2.4.2 Installation and approval of the heating system

The boiler should be operated in a closed heating system. The following standards govern the installation:

Note on standards

ÖNORM / DIN EN 12828 Heating Systems in Buildings

NOTICE! Each heating system must be officially approved.

The appropriate supervisory authority (inspection agency) must always be informed when installing or modifying a heating system, and authorisation must be obtained from the building authorities:

Austria: Inform the civic/municipal building authorities.

Germany: Notify an approved chimney sweep and the building authorities.

2.4.3 General information for installation room (boiler room)

Boiler room characteristics

- There must not be a potentially explosive atmosphere in the boiler room as the boiler is not suitable for use in potentially explosive environments.
- The boiler room must be frost-free.
- The boiler does not provide any light, so the customer must provide sufficient lighting in the boiler room in accordance with national workplace design regulations.
- When using the boiler over 2000 metres above sea level you should consult the manufacturer.
- Danger of fire due to flammable materials.
  No flammable materials should be stored near the boiler. Flammable objects (e.g. clothing) must not be put on the boiler to dry.
- Damage due to impurities in combustion air.
  Do not use any solvents or cleaning agents containing chlorine in the room where the boiler is installed.
- Keep the air suction opening of the boiler free from dust.

Ventilation of the boiler room

Ventilation air for the boiler room should be taken from and expelled directly outside, and the openings and air ducts should be designed to prevent weather conditions (foliage, snowdrifts, etc.) from obstructing the air flow.

Unless otherwise specified in the applicable building regulations for the boiler room, the following standards apply to the design and dimensions of the air ducts:

Note on standards

ÖNORM H 5170 - Construction and fire protection requirements

2.4.4 Requirements for central heating water

The following standards and guidelines apply:

Note on standards

Austria:	ÖNORM H 5195-1
Germany:	VDI 2035
Switzerland:	SWKI 97-1
Italy:	D.P.R. no. 412

NOTICE! Note on filling with make-up water: Always bleed the filling hose before connecting, in order to prevent air from entering the system.

Observe the standards and also follow the recommendations below:

- ❒ Max. cumulative value for alkaline earth: 1.0 mmol/l or 100 mg/l (corresponds to 5.6 dH)
- ❒ Use softened water as the make-up water
- ❒ Avoid leaks and use a closed heating system to maintain water quality during operation

2.4.5 Notes for using pressure maintenance systems

Pressure maintenance systems in hot-water heating systems keep the required pressure within predefined limits and balance out volume variations caused by changes in the hot-water temperature. Two main systems are used:

Compressor-controlled pressure maintenance

In compressor-controlled pressure maintenance units, a variable air cushion in the expansion tank is responsible for volume compensation and pressure maintenance. If the pressure is too low, the compressor pumps air into the tank. If the pressure is too high, air is released by means of a solenoid valve. The systems are built solely with closed-diaphragm expansion tanks to prevent the damaging introduction of oxygen into the domestic hot water.

Pump-controlled pressure maintenance

A pump-controlled pressure maintenance unit essentially consists of a pressure-maintenance pump, relief valve and an unpressurised receiving tank. The valve releases hot water into the receiving tank if the pressure is too high. If the pressure drops below a preset value, the pump draws water from the receiving tank and feeds it back into the heating system. Pump-controlled pressure maintenance systems with **open expansion tanks** (e.g. without a diaphragm) introduce ambient oxygen via the surface of the

water, exposing the connected system components to the risk of corrosion. These systems offer no oxygen removal for the purposes of corrosion control as required by VDI 2035 and **in the interests of corrosion protection should not be used**.

2.4.6 Return lift

If the hot water return is below the minimum return temperature, some of the hot water outfeed will be mixed in.

⚠ CAUTION

Risk of dropping below dew point/condensation formation if operated without return temperature control.

Condensation water forms an aggressive condensate when combined with combustion residue, leading to damage to the boiler.

Take the following precautions:

❒ Regulations stipulate the use of a return temperature control.

➥ The minimum return temperature is 60 °C. We recommend fitting some sort of control device (e.g. thermometer).

2.4.7 Combination with storage tank

Observe the regional regulations for using a storage tank!

Certain subsidy guidelines prescribe compulsory requirements for the installation of storage tanks. Up-to-date information about individual subsidy guidelines can be found at www.froeling.com.

General information

Channelling the heat generated by the Firewood boiler to a storage tank, can bring major advantages, including:

- ❒ better utilisation of fuel
- ❒ more user-friendly operation in terms of reloading intervals
- ❒ maximum independence from instantaneous heating requirements
- ❒ minimal dirt in boiler and flue gas system

As the boiler's minimum continuous heat output is 30% above the nominal heat output, we as boiler manufacturer are obliged under EN 303-5:2012, Section 4.4.6 to advise that the Firewood boiler S1 Turbo must always be connected to a storage tank with adequate storage capacity.

Certain countries have recommended storage capacities; these are listed below. The specified values apply when the nominal heat output of the boiler corresponds to the heating requirements of the building and a maximum of 50% of the nominal heat output can be dissipated to the building being heated under partial load conditions.

The storage tank capacity can be calculated according to EN 303-5:2012 using the following formula:

$$V_{Sp} = 15T_B \times Q_N (1 - 0.3 \times Q_H/Q_{min})$$

V_{Sp}	Storage tank capacity in [l]
Q_N	Nominal heat output of boiler in [kW]
T_B	Burn-off period of boiler in [h][1)]
Q_H	Heating load of building in [kW]
Q_{min}	Minimum heat output of boiler in [kW] [2)]

1. Sample combustion times for various fuels are provided in the technical data
2. The boiler's minimum output is the lowest value of the output range in the technical data. If there is no minimum heat output specified, use the nominal heat output ($Q_{min} = Q_N$)

NOTICE! EN 303-5:2012 stipulates that the storage tank capacity is at least 300l!

Austria

According to the relevant Austrian laws governing energy technology, which are based on Art. 15a B-VG "Agreement on protective measures for small furnaces" (2012):

No storage tank is required on manually fed biomass boilers that have been positively tested at both nominal load and partial load (below 50% of nominal load) to ensure they adhere to the emissions limits specified in that agreement.

Recommended storage tank capacity:

	Unit	S1 Turbo 15	S1 Turbo 15S	S1 Turbo 20
Recommended storage tank capacity[1)]	[l]	1000	1000	1000
1. Values for calculating the capacity can be found in the technical data or the technical data with partial load inspection (if available)				

Germany The first BImSchV (Ordinance on small and medium-sized heating plants of 26 January 2010, BGBl. I p. 38) stipulates a minimum water heat storage tank capacity of 55 litres per kilowatt of nominal heat output; a water heat storage tank with a capacity of 12 litres per litre of fuel loading chamber is recommended.

Recommended storage tank capacity:

	Unit	S1 Turbo 15	S1 Turbo 20
Recommended storage tank capacity[1)]	[l]	1000	1500
1. Values for calculating the capacity can be found in the technical data or the technical data with partial load inspection (if available)			

For the correct dimensions of the storage tank and the line insulation (e.g. in accordance with ÖNORM M 7510 or guideline UZ37) please consult your installer or Froling.

2.4.8 Chimney connection/chimney system

EN 303-5 specifies that the entire flue gas system must be designed to prevent, wherever possible, damage caused by seepage, insufficient feed pressure and condensation. Please note in this respect that flue gas temperatures lower than 160K above room temperature can occur in the permitted operating range of the boiler.

The flue gas temperatures (for clean systems) and additional flue gas values can be found in the table below.

The connection between the boiler and the chimney system should be as short as possible. The upward angle of the connection should not exceed 30 - 45°. Insulate the connection. The entire flue gas system - chimney and connection - should be calculated in accordance with EN 13384-1.

Local regulations and other statutory regulations also apply.

NOTICE! The chimney must be authorised by a smoke trap sweeper or chimney sweep.

Draught limiter

The installation of a draught limiter is recommended.

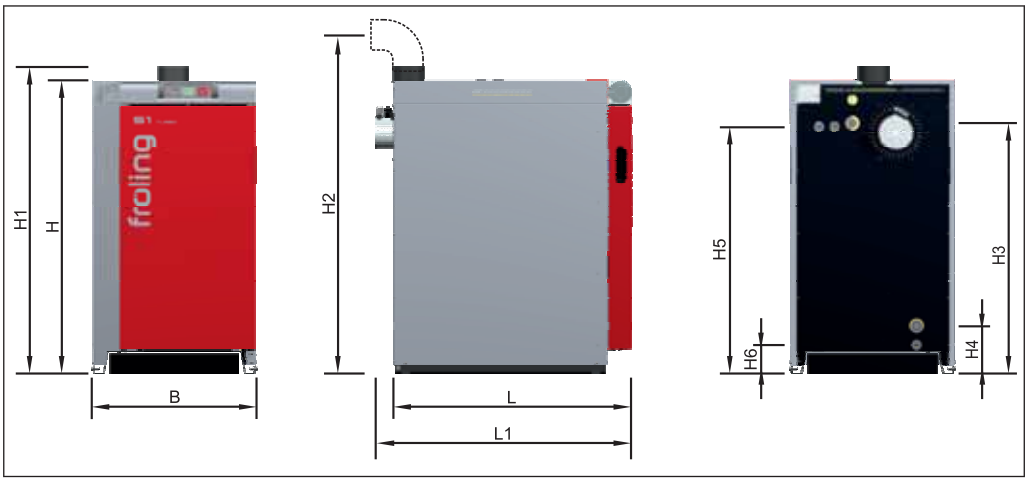
NOTICE! Install the draught limiter directly under the mouth of the flue line, as the pressure is constantly low at this point.

Boiler data for planning the flue gas system

Name		S1 Turbo 15	S1 Turbo 15S	S1 Turbo 20
Flue gas temperature at nominal load	°C	150	160	170
Flue gas temperature at partial load	°C	-	120	130
Flue gas mass flow at nominal load	kg/s	0.010	0.012	0.013
Flue gas mass flow at partial load	kg/s	-	0.006	0.007
Required feed pressure at nominal and partial load	mbar	0.08	0.08	0.08
Maximum permissible feed pressure	In accordance with ÖNORM/DIN EN 303-5			
Flue pipe diameter	mm	130	130	130

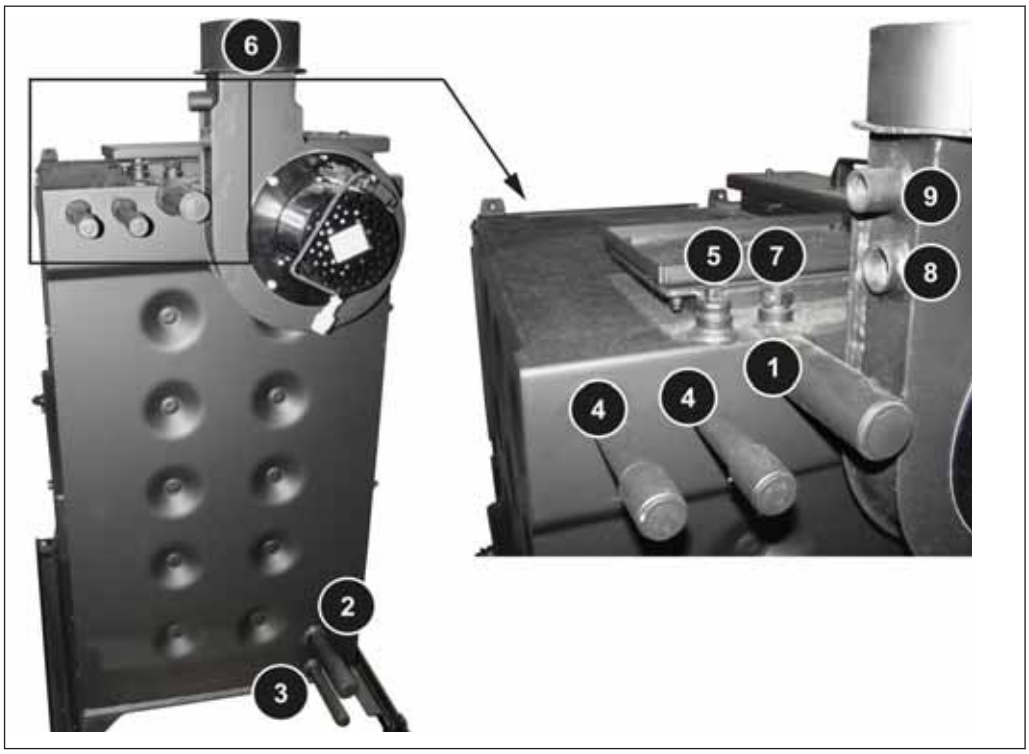
3 Technology

3.1 Dimensions



Dimen-sion	Name	Unit	S1 Turbo
L	Length, boiler	mm	1000
L1	Total length incl. induced draught fan		1080
W	Width, boiler		685
H	Height, boiler		1235
H1	Total height incl. Flue gas nozzle		1290
H2	Height, flue pipe connection		1450
H3	Height, flow connection		1055
H4	Height, return connection		200
H5	Height, safety battery connection		1040
H6	Height, drainage connection		120

3.2 Components and connections



Item	Name	Unit	S1 Turbo
1	Boiler flow connection	Inches	1
2	Boiler return connection	Inches	1
3	Drainage connection	Inches	½
4	Safety battery connection	Inches	½
5	Immersion sleeve for thermal discharge valve (supplied by the customer)	Inches	½
6	Flue gas pipe connection	mm	130
7	Immersion sleeve for boiler sensor and STL	Inches	½
8	Broadband probe connection	Inches	¾
9	Flue gas temperature sensor connection	Inches	½

3.3 Technical specifications

Name		S1 Turbo 15	S1 Turbo 20
Nominal heat output	kW	15	20
Electrical connection	230V / 50Hz / fused C13A		
Power consumption at nominal load	W	37	42
Power consumption in slumber mode		3	3
Weight of boiler incl. insulation and control	kg	455	465
Total boiler capacity (water)	l	90	90
Water pressure drop (ΔT = 10 / 20 K)	mbar	3.5 / 0.5	8.3 / 1.5
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	
Permitted operating pressure	bar	3	
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN 14961	Part 5: Firewood class A2 / D15 L50		
Fuel loading door dimensions (width / height)	mm	350 / 360	350 / 360
Fuel loading chamber capacity	l	80	80
Combustion time [1] - Beech	h	4.9 - 7.0	3.5 - 5.0
Combustion time[1] - Spruce		3.0 - 4.2	2.1 - 3.0

1. Values specified for combustion time are guideline values at nominal load and will vary depending on water content (15-25%) and fill level (80-100%)

Test report data - Lambda Control

Name		S1 Turbo 15	S1 Turbo 20
Testing institute		TÜV Austria[1]	TÜV Austria[1]
Test report no.		13-UW/Wels-EX-044/1	13-UW/Wels-EX-044/2
Date of issue		20/03/2013	21/03/2013
Boiler class as per EN 303-5:2012		5	5
Boiler efficiency	%	92.5	92.0

1. TÜV Austria Services GmbH, Geschäftsbereich Umweltschutz, Am Thalbach 15, A-4600 Thalheim/Wels

Test data - Emissions in [mg/MJ][1] (nominal load)			
Carbon monoxide (CO)	mg/MJ	69	51
Nitrogen oxide (NOx)	mg/MJ	80	88
Organic hydrocarbons (OGC)	mg/MJ	3	3
Dust	mg/MJ	8	10

1. The pollutant concentration is specified as a mass based on the energy content of the fuel fed to the combustion system in mg/MJ

Test data - Emissions in [mg/m³][1] (nominal load)			
Carbon monoxide (CO)	mg/m³	102	75
Nitrogen oxide (NOx)	mg/m³	118	129
Organic hydrocarbons (OGC)	mg/m³	5	5
Dust	mg/m³	11	15

1. Emissions values based on dry flue gas at standard temperature and pressure (0°C, 1013 mbar) with a volume content of oxygen of 13%

Test report data - Manual controller

Name		S1 Turbo 15	S1 Turbo 20
Testing institute		TÜV Austria[1)]	TÜV Austria[1)]
Test report no.		13-UW/Wels-EX-044/3	13-UW/Wels-EX-044/4
Date of issue		18/06/2013	19/06/2013
Boiler class as per EN 303-5:2012		5	5
Boiler efficiency	%	92,6	92,6

1. TÜV Austria Services GmbH, Geschäftsbereich Umweltschutz, Am Thalbach 15, A-4600 Thalheim/Wels

Test data - Emissions in [mg/MJ][1)] (nominal load)			
Carbon monoxide (CO)	mg/MJ	165	100
Nitrogen oxide (NOx)	mg/MJ	90	86
Organic hydrocarbons (OGC)	mg/MJ	4	2
Dust	mg/MJ	8	10

1. The pollutant concentration is specified as a mass based on the energy content of the fuel fed to the combustion system in mg/MJ

Test data - Emissions in [mg/m³][1)] (nominal load)			
Carbon monoxide (CO)	mg/m³	243	147
Nitrogen oxide (NOx)	mg/m³	132	126
Organic hydrocarbons (OGC)	mg/m³	6	4
Dust	mg/m³	11	14

1. Emissions values based on dry flue gas at standard temperature and pressure (0°C, 1013 mbar) with a volume content of oxygen of 13%

4 Assembly

4.1 Materials supplied

The boiler comes on a pallet together with insulation, controller and accessories. Some of the components come in cardboard packaging.

1	Boiler	Accessories (not pictured):
2	Insulation	▪ Induced draught and seals
3	Controller	▪ Cleaning devices

4.1.1 Tools required

The following tools are required for assembling the S1 Turbo:

- ❒ Spanner or box wrench set (widths across flats 8 – 32 mm)
- ❒ Allen key set
- ❒ Flat head and cross-head screw drivers
- ❒ Hammer
- ❒ Diagonal cutting pliers
- ❒ Half-round file
- ❒ Power drill or cordless screwdriver with Torx bit insert

4.2 Positioning

NOTICE

Damage to components if handled incorrectly

- ❒ Follow the transport instructions on the packaging.
- ❒ Transport components with care to avoid damage
- ❒ Protect the packaging against damp
- ❒ Pay attention to the pallet's centre of gravity when lifting

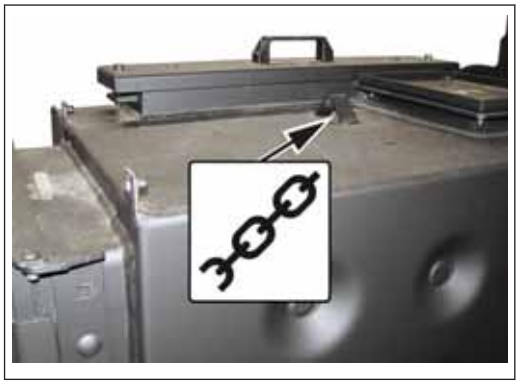
- ❒ Position a fork-lift or similar lifting device at the pallet and bring in the components

If the boiler cannot be brought in on the pallet:

❒ Remove the cardboard and remove the boiler from the pallet

⇨ See "Removing boiler from pallet" [page 19]

Positioning using a crane



❒ Attach the crane hook to the attachment point correctly and position the boiler

4.3 Temporary storage

If the system is to be assembled at a later stage:

❒ Store components at a protected location, which is dry and free from dust

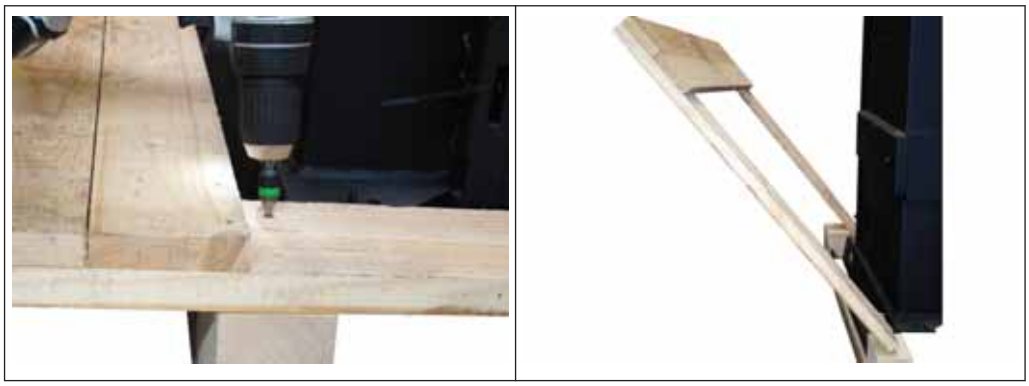
➥ Damp and frost can damage components, particularly electric ones!

4.4 Setting up in the boiler room

4.4.1 Removing boiler from pallet

❒ Lift the cardboard box with the insulation off the pallet

❒ Remove the cardboard with the controller from the boiler and put in a safe place



❒ Undo the screws on the top frame of the pallet

➥ Two screws each on the right and left, front and back

❒ Remove the top frame of the pallet

❒ Undo the four screws which connect the side of the boiler to the bottom supports of the pallet

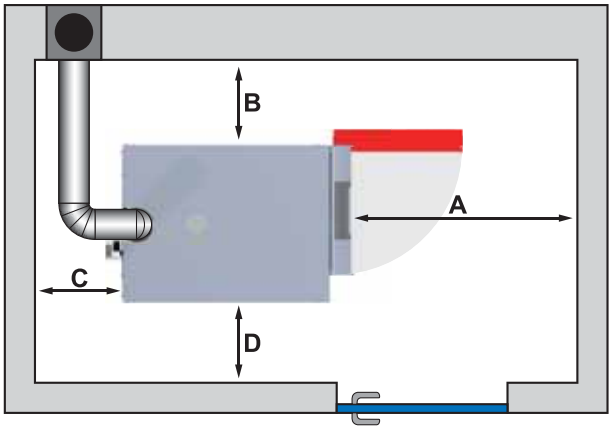
❒ Lift the boiler using a fork-lift or similar lifting device with the appropriate load-bearing capacity and remove the bottom supports of the pallet

❒ Transport boiler to the intended position in the installation room

➥ Observe the minimum distances from other objects in the boiler room!

4.4.2 Minimum distances in the boiler room

- The system should generally be set up so that it is accessible from all sides allowing quick and easy maintenance.
- Regional regulations regarding necessary maintenance areas for inspecting the chimney should be observed in addition to the specified minimum distances!
- Observe the applicable standards and regulations when setting up the system.
- Observe additional standards for noise protection (ÖNORM H 5190 - Noise protection measures)



Dimension	Name	Unit	S1 Turbo
A	Distance - front of boiler to wall	mm	800
W	Distance – side of boiler to wall		200 (500)[1)]
C	Distance – back to wall		400
D	Distance – side of boiler to wall		200 (500)[1)]

1. One side of the boiler (B or D) should be at least 500 mm from the wall to allow easy access for connecting the appliance and for maintenance work (e.g. induced draught).

4.5 Before Installation

4.5.1 Changing the stop of the fuel loading door and the combustion chamber door

The boiler comes with the door stop on the right. If you want to change the side the door stops are on, proceed as follows.

Changing the fuel loading door stop

The following example using the fuel loading door shows how to change the door stop. The procedure is the same for changing the stop on the combustion chamber door.

❒ Open the fuel loading door

❒ Undo the bushing and screws on the handle and remove the handle

❒ Undo the retainer of the hinge pin at the top and bottom door hinge

➥ For example, use two screwdrivers to gently bend the retainer plate out to loosen it

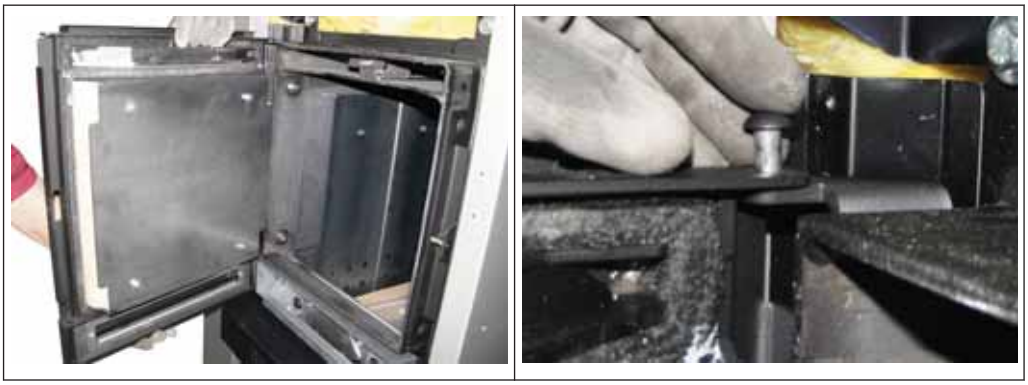
❒ Take out the top and bottom hinge pins

❒ Take off the fuel loading door

❒ Remove the locking plate and hinge
  ➥ Do this by undoing the locking cam and lock nut
❒ Fit the hinge back onto the other side

❒ Attach the locking cam at the top and bottom as shown and secure with spacer washer and lock nut

❒ Attach the locking plate to the other side
❒ Using the locking cam, spacer washer and lock nut secure at the top and bottom as shown



❒ Hang the door again with the stop on the other side
❒ Secure at the top and bottom with the hinge pins

❒ Refit the retainers to the top and bottom hinge pins
➥ Use, for example, two screwdrivers
❒ Refit the handle to the fuel loading door using bushing and screws

NOTICE! If the door stops have been changed, you must check the seal of the doors and readjust if necessary.

⇨ See "Checking the seal on the doors" [page 24]
⇨ See "Positioning the doors" [page 25]

4.5.2 Checking the seal on the doors

The example below shows how to check the seal on the fuel loading door. The procedure is the same for checking the seal on the combustion chamber door.

❒ Insert a sheet of paper at the side of the door stop at the top between the door and the boiler

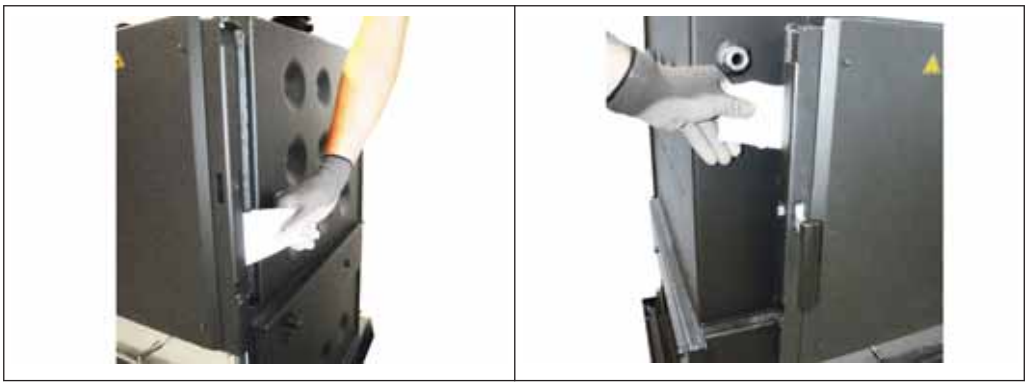
❒ Close the door

❒ Try to pull out the sheet of paper

➥ If the paper cannot be removed:
The door seal is OK and the settings are correct

➥ If the paper can be removed:
The door seal is not OK and will need to be reset
Increase the contact pressure at the locking cam:
⇨ See "Positioning the doors" [page 25]

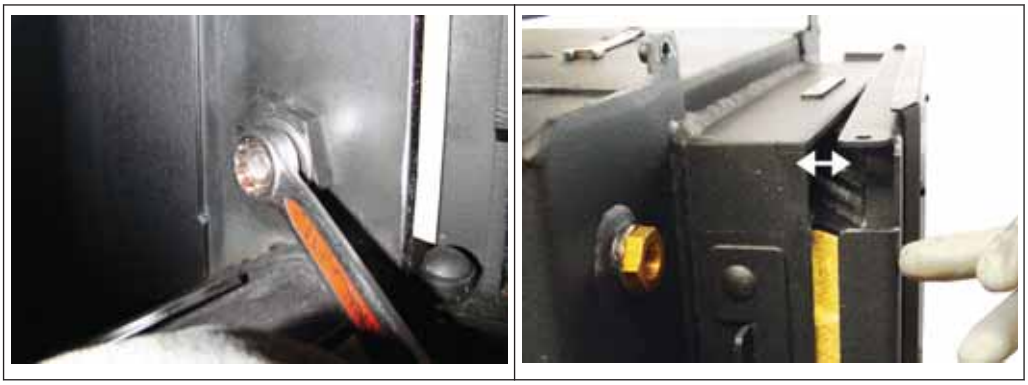
❒ Check the seal again after positioning the doors



❒ Repeat the procedure at the side of the door stop at the bottom and at the side of the door handle

4.5.3 Positioning the doors

The example below shows how to position the fuel loading door. The procedure is the same for positioning the combustion chamber door.



❒ Using an Allen key (13 mm), loosen the lock nuts on the locking cams at the top and bottom

❒ Close the door

➥ With a gap of approx. 2 to 3 cm there must be a noticeable resistance

❒ If the resistance is too low or too high, move the locking cams backwards or forwards using an Allen key (32 mm)

➥ The movement of the locking cams causes the hinged plate to move, allowing the contact pressure to be adjusted

➥ Caution: Both locking cams (top and bottom) must be aligned in the same way

❒ Close the door

❒ If the door will not close, move the locking cams forward slightly

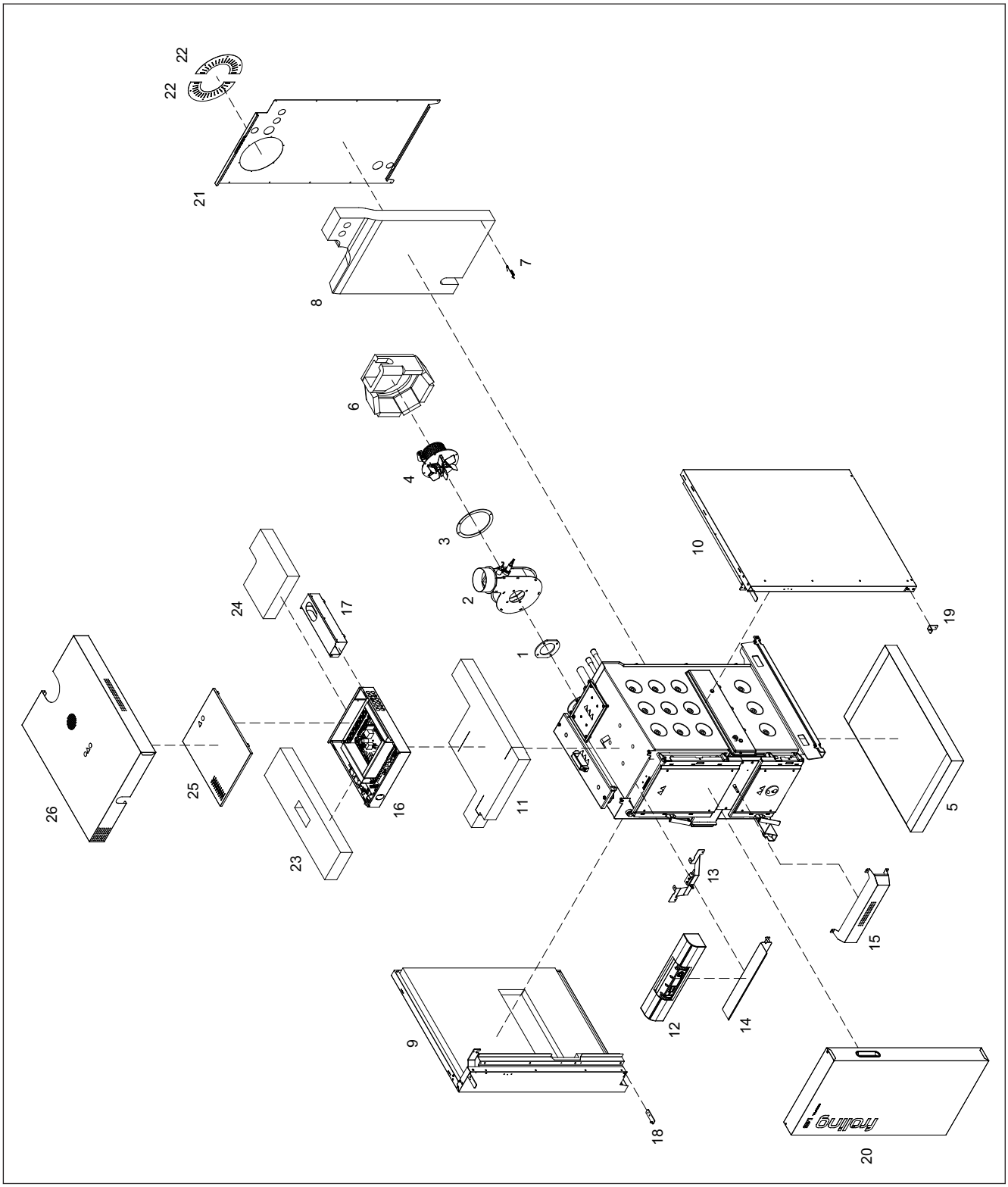
➥ Caution: Both locking cams (top and bottom) must be aligned in the same way

❒ Secure the lock nuts again

The locking plate can be moved in the same way using the locking cam at the side of the door handle, allowing the contact pressure to be adjusted on this side

4.6 Installing the boiler

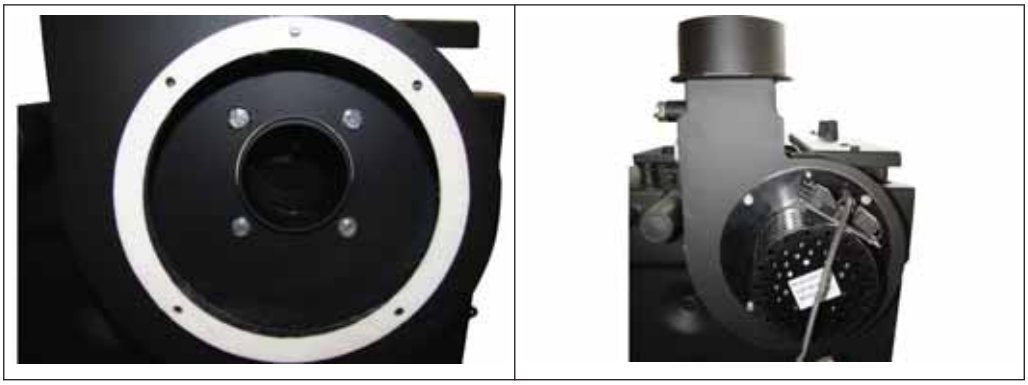
4.6.1 Assembly overview



Item	Quantity [units]	Name
1	1	Kerafaser seal for induced draught unit housing
2	1	Welded part for induced draught unit housing
3	1	Fibre-glass seal for induced draught fan
4	1	Induced draught fan SPG ø180
5	1	Complete floor insulation
6	1	Thermal insulation for induced draught unit housing
7	13	Tension spring
8	1	Thermal insulation for insulating back panel
9	1	Insulating side panel, left, complete
10	1	Insulating side panel, right, complete
11	1	Heat insulation mat, top, front
12	1	Control, complete
13	1	Bracket with door contact switch
14	1	Cover plate, front
15	1	Cover plate for servo-motor
16	1	Controller, complete
17	1	Cable duct
18	1	Door bearing, left
19	1	Door bearing, right
20	1	Insulated door, front
21	1	Insulated back panel, complete
22	2	Induced draught cover plate
23	1	Heat insulation mat, top, side
24	1	Heat insulation mat, top, back
25	1	Controller lid, complete
26	1	Controller cover, complete

4.6.2 Installing the induced draught fan

- ❒ Position the Kerafaser seal at the flange for the flue gas pipe
- ❒ Position the induced draught unit housing with the flue gas connection facing up and secure with the four screws and spacer washers
- ❒ Secure the dowel pin at position 1

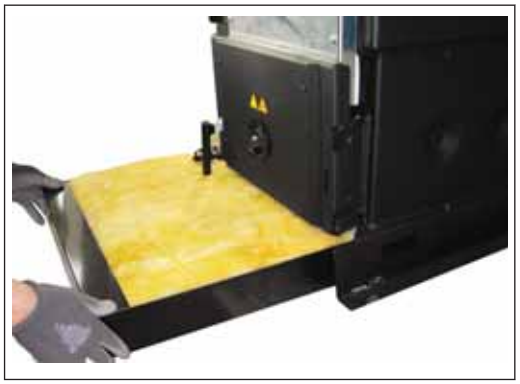


- ❒ Mount the fibre-glass seal for the induced draught fan on the dowel pin
- ❒ Position the induced draught fan and secure with the four screws and spacer washers

4.6.3 Installing the insulation

NOTICE

Separate parts of the boiler are fitted with a protective film. This MUST be removed before assemby!

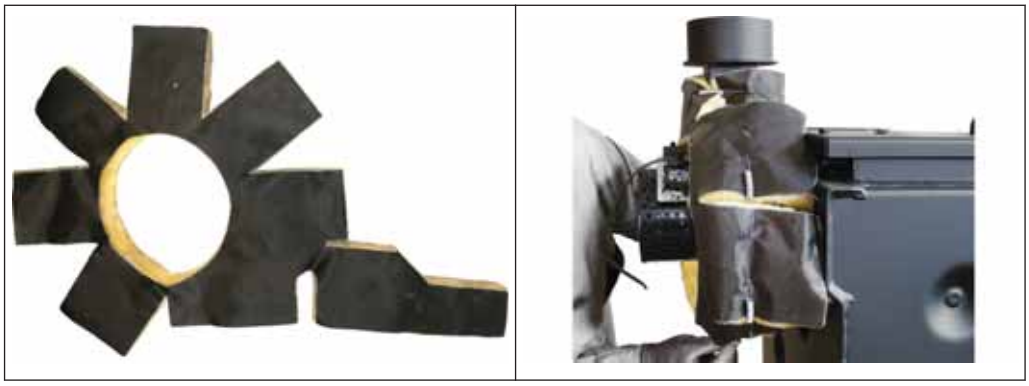


❒ Slide the floor insulation under the boiler from the front

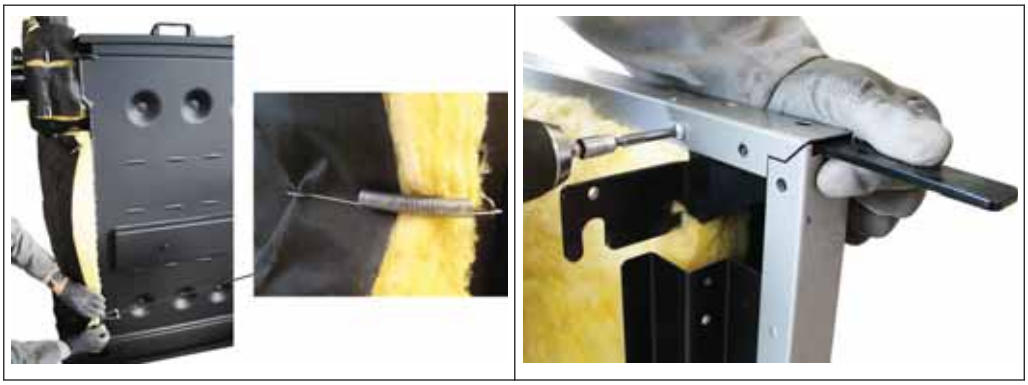
For WOS lever option The next two steps should be performed if the boiler features a WOS lever:

❒ Remove the square plug at the front left of the boiler and replace with brass bushing

❒ Tighten the brass bushing with Allen wrench (27 mm)

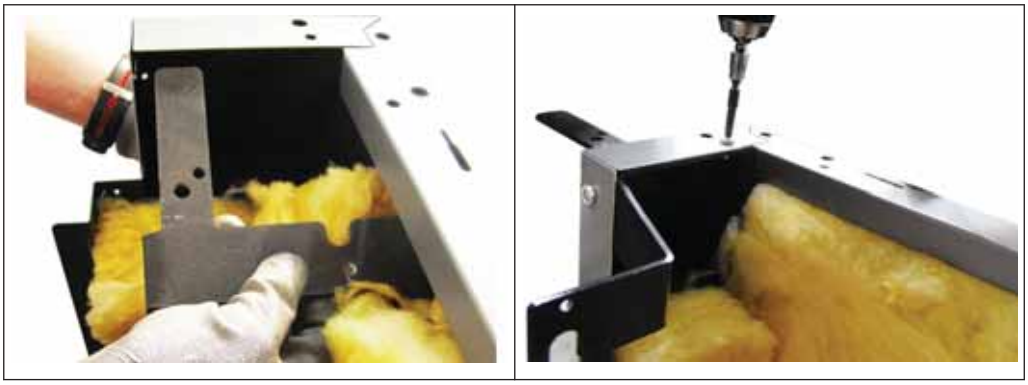


❒ Insert the thermal insulation for induced draught and secure with the tension springs



❒ Position the rear thermal insulation at the back panel and secure to the boiler with the tension springs

❒ Insert the bracket for the control in the right-hand insulating side panel and secure with three screws



❒ Insert the bracket for the control in the left-hand insulating side panel

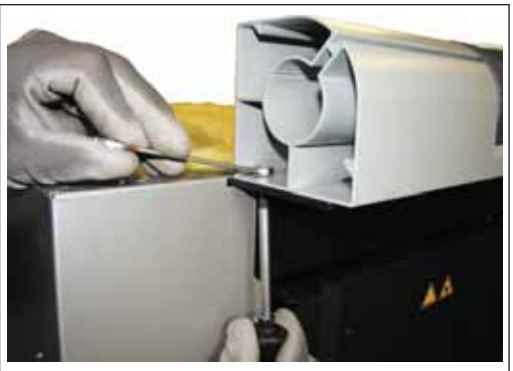
➥ Run the bracket diagonally from bottom to top

❒ Secure the bracket with three screws

❒ Attach the right and left insulating side panels of the boiler

➥ First fit the bottom to the side bolts

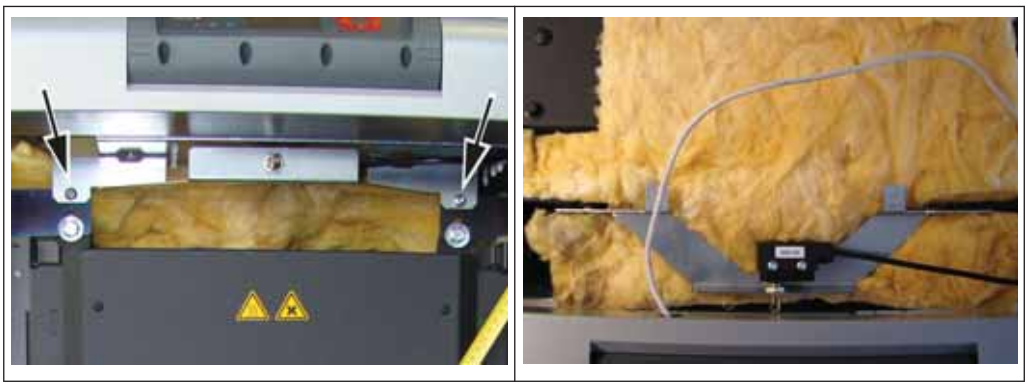
❒ The left insulating side panel also needs to be fitted onto the front fastening bolt
❒ Secure the insulating side panels to the boiler with the bracket
➥ Only screw in the screws loosely



❒ Place top heat insulation mat on boiler
❒ Secure the control to the bracket on the left and right using screws

❒ Attach the hinge pins for the insulated door to the side of the door stop
❒ Measure the diagonals and align the insulating side panels so that the two diagonals are the same
➥ Adjust the position of the side panels if necessary

❒ Once the side panels have been aligned, secure the screws to the bracket
❒ Screw the outer screws into the insulating side panels



❒ Fit the bracket with door contact switch

4.6.4 Fitting the air control

Variant 1 - Fitting the servo-motor

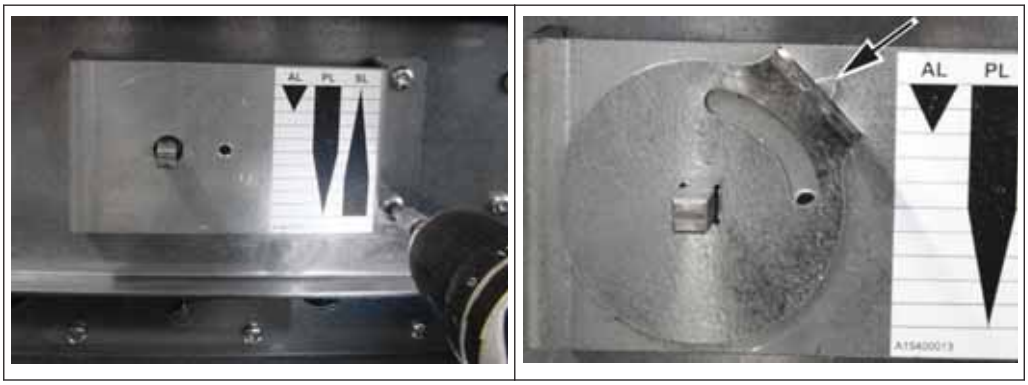
❒ Turn the sliding valve for the air duct in an anti-clockwise direction as far as the stop
❒ One of the pins of the air damper has to make contact with the left of the stop screw (pos. 1)

- ❒ Set the direction of rotation of the servo-motor (1) to left (L)
- ❒ Press the unlock key (2) and turn the drive for the shaft to the air duct (3) in an anti-clockwise direction as far as the stop
- ❒ Place the servo-motor on the shaft and secure the motor with torque support

- ❒ Run the cable of the servo-motor through the cable duct to the controller
- ❒ Fit the cover plate for the air control

Variant 2 - Fitting the manual controller

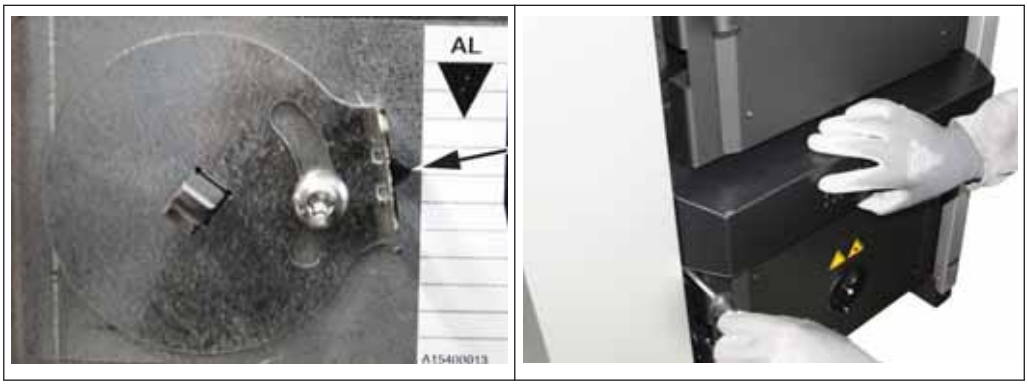
- ❒ Turn the sliding valve for the air duct in an anti-clockwise direction as far as the stop
- ❒ One of the pins of the air damper has to make contact with the left of the stop screw (pos. 1)



❒ Place the mounting plate for the manual controller on the shaft and secure with the screws

❒ Place the manual controller on the shaft

➥ The arrow should be at the top right (see picture)

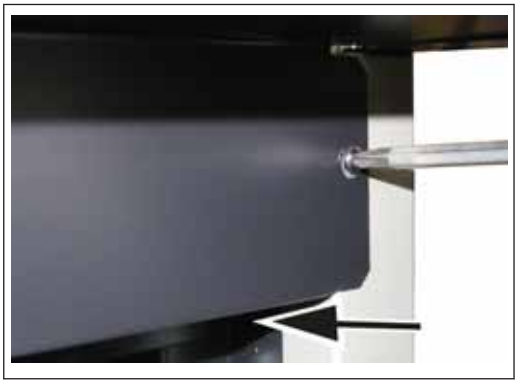


❒ Turn the manual controller to the right (see picture) and secure with the screw

➥ The exact position of the manual controller is set on initial start-up
⇨ See "Boiler with manual controller" [page 53]

➥ Fit the cover plate for the air control

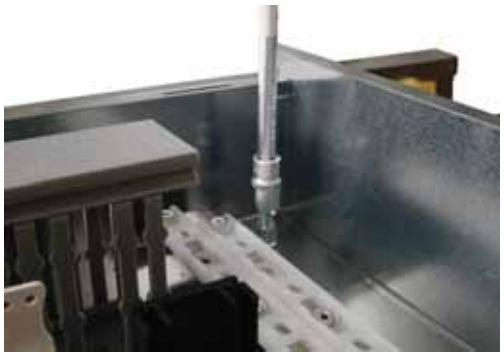
4.6.5 Fitting the controller box



❒ Fit the cover plate beneath the control

❒ Thread the cable of the servo-motor, door contact switch and control through the hole on the bottom of the controller box

❒ Place the controller box on the boiler



❒ Secure the controller box with three screws incl. contact washers

❒ Align the controller box horizontally using the fourth screw at the back left

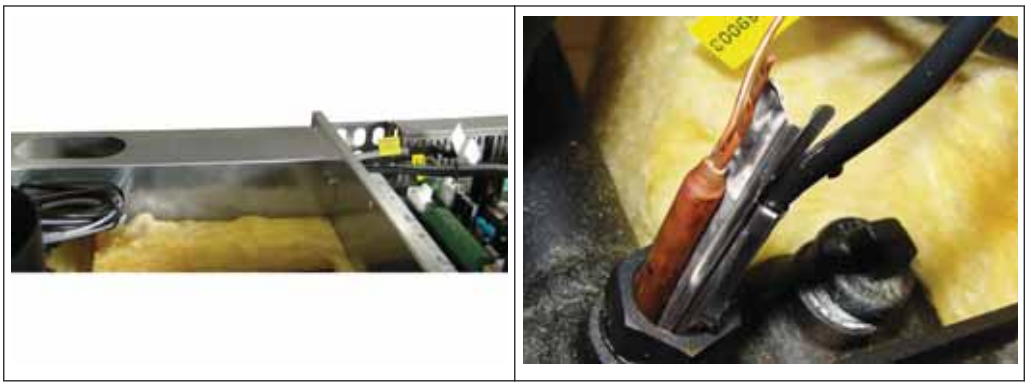
❒ Position the cable duct at the right edge of the insulating side

➥ Insert the cable duct attachment hook into the holes provided on the insulating side panel

❒ Secure the cable duct at the back of the controller with screw incl. contact washer

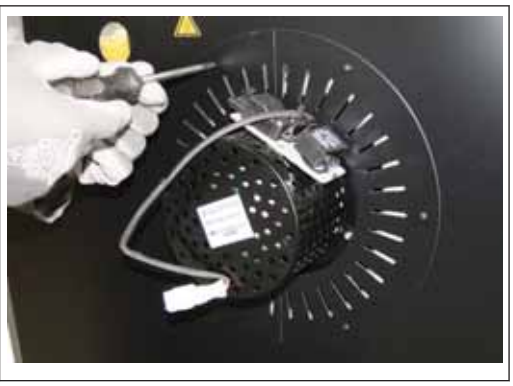
4.6.6 Fitting the broadband probe, flue gas temperature sensor and STL

- ❒ Unscrew the pre-installed bushing from the broadband probe
- ❒ Screw the bushing into the induced draught box and gently tighten
- ❒ Screw the broadband probe into the bushing and gently tighten using an Allen wrench (22 mm)
- ❒ Screw in the brass bushing for the flue gas temperature sensor
- ❒ Push the flue gas temperature sensor in so that approx. 20 mm protrudes from the housing and secure the position with the wing screw



- ❒ Run the cable from the broadband probe and flue gas temperature sensor to the controller box via the cable duct
  - ➥ Tuck any extra cable into the cable duct
- ❒ Push the boiler sensor and STL capillary into the pre-installed immersion sleeve with the pressure spring during boiler outfeed

4.6.7 Attaching the induced draught cable



❒ Fit the insulated back panel and secure with the screws

❒ Fit the cover plate for ID fan

❒ Run the induced draught cable through the hole in the insulated back panel to the induced draught unit via the cable duct

➥ Tuck any extra cable into the cable duct

❒ Attach the two induced draught cables and secure with cable ties

4.6.8 Installing the insulated door

Right door stop

❒ Insert the door bearing provided for the right stop into the hole provided on the right insulation side panel and secure with two screws

❒ Fit the counter plate provided for magnetic latch to the left insulation side panel
❒ Hang the bottom of the insulated door onto the bolt of the door bearing

❒ Position the top of the insulated door and secure with the hinge pin
❒ Attach the caps on the ends of the control on each side

Left door stop

❒ Measure the distance from the hinge pin on the control to the left insulated side panel
❒ Punch out the perforated flap for the door bearing on the left insulated side panel using an appropriate tool (e.g. screwdriver)

❒ Insert the door bearing provided for the left stop into this hole and secure underneath with two screws

➥ The distance between the bolt and the door bearing must be exactly the same as the distance of the hinge pin on the control

❒ Fit the counter plate for magnetic latch provided to the right insulation side panel

❒ Hang the bottom of the insulated door onto the bolt of the door bearing

❒ Position the top of the insulated door and secure with the hinge pin

❒ Attach the caps on the ends of the control on each side

4.7 Electrical connection and wiring

DANGER

When working on electrical components:

Risk of electrocution!

When work is carried out on electrical components:

- ❒ Only have work carried out by a qualified electrician
- ❒ Observe the applicable standards and regulations
  - ➥ Work must not be carried out on electrical components by unauthorised persons

- ❒ Wire the broadband probe, flue gas temperature sensor, boiler sensor, induced draught unit, STL, door contact switch and servo-motor as described in the operating instructions for the boiler control

- ❒ Wire the components according to the electrical connection diagram
  - ➥ Flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations.

Once the individual components have been wired:

- ❒ Wire the mains connection in the controller box
  - ➥ The power supply line (mains connection) must be fitted with a max. C13A fuse by the customer.
  - ➥ Observe the circuit diagrams in the boiler controller operating instructions.

4.7.1 Information on circulating pumps

NOTICE

According to 2012/622/EU external, wet running circulating pumps must comply with the following limit values of the Energy Efficiency Index (EEI):

- Effective from 01/01/2013: Wet running circulating pumps with EEI ≤ 0.27
- Effective from 08/01/2015: Wet running circulating pumps with EEI ≤ 0.23

Only high efficiency pumps with a connection option for a control signal (PDM / 0-10V) should be connected to speed-controlled pump outputs (pump 1 on the core module and pump outputs on the hydraulic module). In this case, the control line is connected to the corresponding PDM outputs of the boards. Observe the connection instructions in the boiler controller documentation!

⚠ CAUTION

When using high efficiency pumps without an additional control line at speed-controlled pump outputs:

Malfunctions of the boiler, the pump and the hydraulic system may occur!

Therefore:

❒ Do not connect EC motor pumps without a control line to the speed-controlled pump outputs of the boards.

➥ Only use special high efficiency pumps with a connection option for a control line (PDM/0-10V)!

➥ Observe the additional instructions and information on board outputs in the operation instructions for the boiler controller.

4.7.2 Concluding work

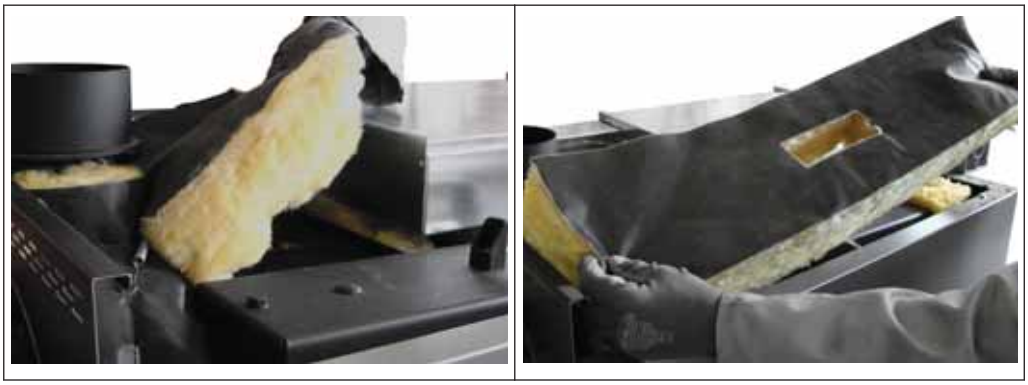
❒ Attach the covers to the controller cable ducts

❒ Put on the controller lid

➥ Insert the lid attachment hooks into the holes provided on the controller

❒ Secure the controller lid with the screw

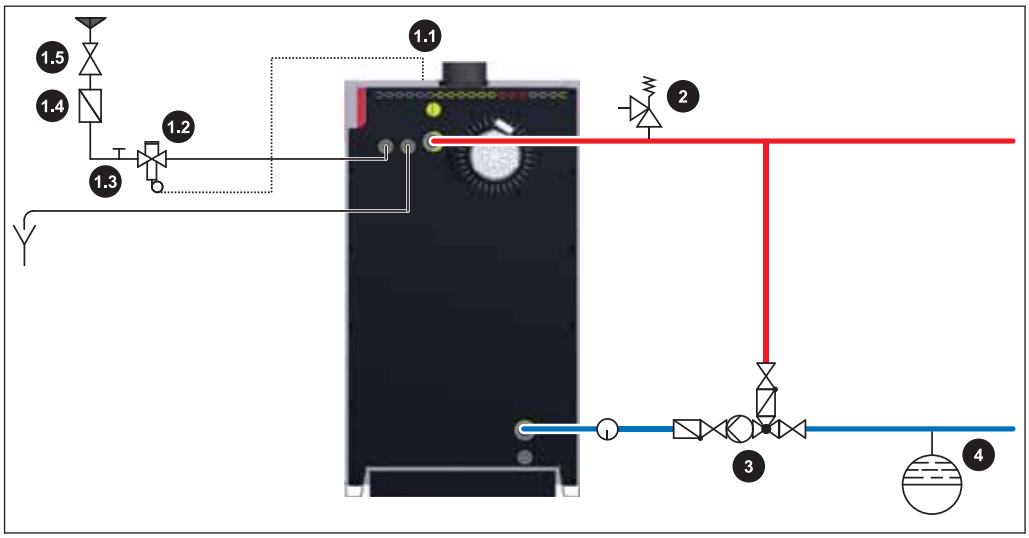
❒ Switch on the main switch on the side of the controller box



❒ Place the insulating mats on the back and side of the boiler

❒ Put on the controller cover

4.8 Connecting the hydraulic safety devices



1 Thermal discharge safety device

- The thermal discharge safety device must be connected in accordance with ÖNORM/DIN EN 303-5 and as shown in the diagram above.
- The discharge safety device must be connected to a pressurised mains water supply in such a way that it cannot be shut off
- A pressure reducing valve (1.5) is required for a cold water pressure of 6 bar minimum cold water pressure = 2 bar

1.1 Sensor of thermal discharge safety device
1.2 Thermal discharge safety device (opens at approx. 95 °C)
1.3 Cleaning valve (T-piece)
1.4 Dirt trap
1.5 Pressure reducing valve

2 Safety valve

- Safety valve as per prEN 1268-1 with a diameter of DN15
- The safety valve must be installed in an accessible place on the heat generator or in direct proximity in the flow pipe in such a way that it cannot be shut off

3 Return temperature control with pump

4 Diaphragm expansion tank

- The diaphragm pressurised expansion tank must conform to EN 13831 and hold at least the maximum expansion volume of the system's heated water including a water seal
- Its size must comply with the design information in EN 12828 - Appendix D
- Ideally it should be installed in the return line. Follow the manufacturer's installation instructions

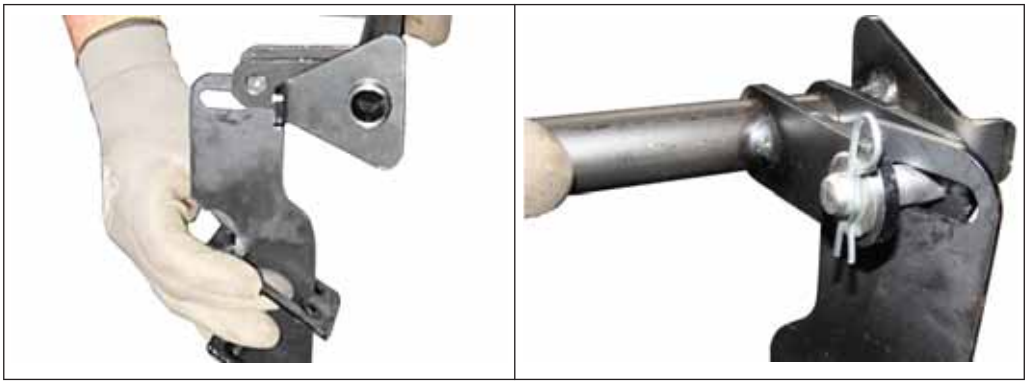
4.9 Installing the WOS system (optional)

You can add an optional WOS lever to the heating system to allow easy cleaning of the heat exchanger from the outside and to provide even greater efficiency.

❒ Remove the controller cover and the side insulating mat

❒ Undo the screws and remove the cleaning lid

❒ Take out all three WOS turbulators

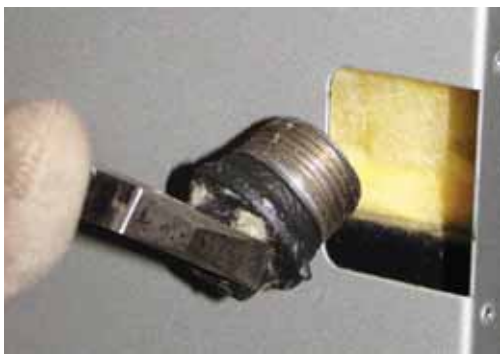


❒ Fit the three WOS turbulators to the brackets on the stay tube provided using eye-bolt, spacer washer and spring cotter

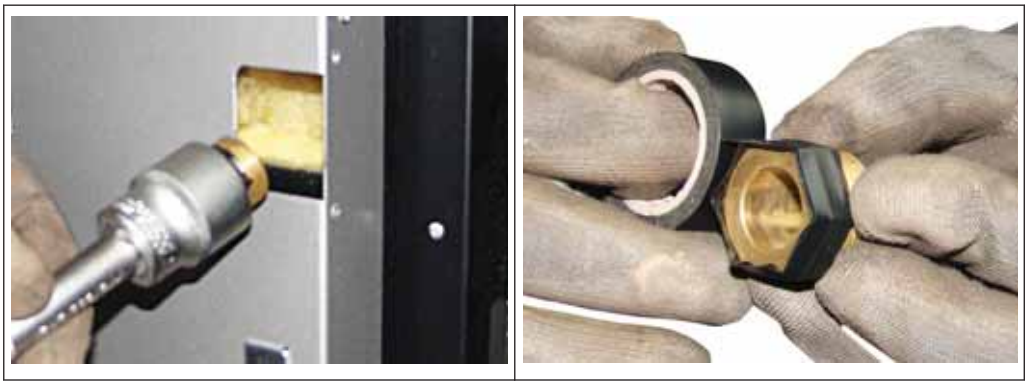
➥ Ensure that you fit the turbulators in the right direction – see image

❒ Put the WOS turbulators and stay tube back in the boiler
↪ Position the bracket with the turbulators in such a way that the stay tube is at the side facing out

❒ Open the insulated door and the fuel loading door
❒ Remove the cover from the front of the insulation
↪ There is a plug behind the cover

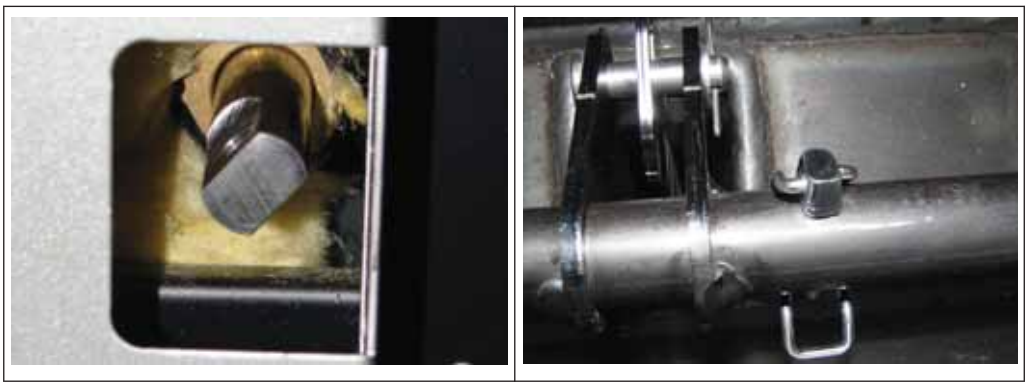


❒ Unscrew the plug using hexagon spanner head (22 mm) and carefully take out using pliers
↪ Ensure that the plug does not fall into the gap between the insulation and cloth-ing plate

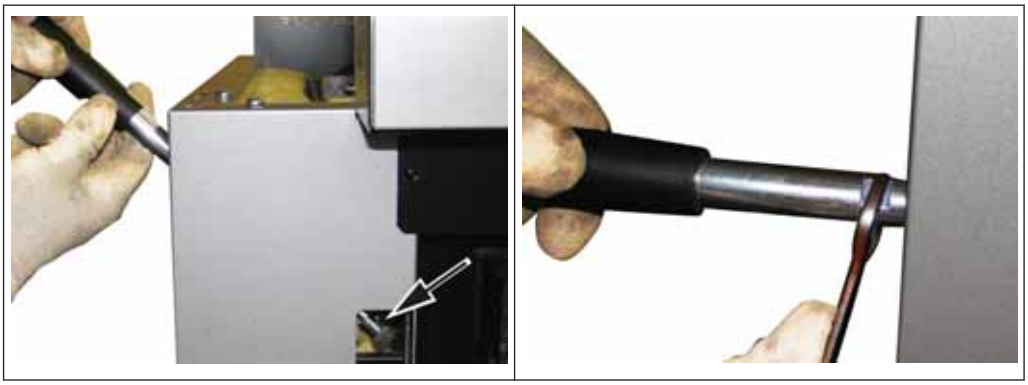


❒ Screw the brass bushing in tight using the hexagon spanner head (27 mm)
  ➥ Tip: Lag the brass bushing provided e.g. with insulating tape, so that it holds well in the socket

❒ Push the shaft provided through the brass bushing and WOS stay tube
❒ The hole in the shaft must match the hole in the stay tube



❒ The two holes roughly match when the flat end of the shaft is positioned as shown above
❒ Secure the shaft to the stay tube with pipe locking pin



❒ Push the WOS lever into the side hole as far as the shaft and tighten
❒ Push the WOS lever down and tighten at the flat part with spanner

❒ Refit the cover to the front of the insulation
❒ Attach the cleaning lid and secure with the screws

❒ Put on the insulating mat and controller cover

❒ Pull the WOS lever 5 – 10 times every time you heat up the boiler
↪ This keeps the heating surfaces clean and saves fuel.

5 Start-up

5.1 Before commissioning / configuring the boiler

The boiler must be adjusted to the heating system during commissioning.

NOTICE

Optimum efficiency and efficient, low-emission operation can only be guaranteed if the system is set up by trained professionals and the standard factory settings are observed.

Take the following precautions:

❒ Initial startup should be carried out with an authorised installer or with Froling customer services

❒ Adjust the boiler controller to the system type

❒ Apply boiler standard values

NOTICE! The keypad assignment and the steps necessary to modify the parameters are detailed in the operating instructions for the boiler control unit.

❒ Check the system pressure of the heating system

❒ Check that the heating system is completely vented

❒ Check that the safety devices are present and working correctly

❒ Check that there is sufficient ventilation in the boiler room

❒ Check the seal of the boiler

↪ All doors and inspection openings must be tightly sealed!

❒ Check that drives and actuators are working and turning in the right direction

NOTICE! For how to check the analogue and digital outputs, see the operating instructions for the boiler controller

❒ Check that the door contact switch is working correctly

NOTICE! For how to check the digital inputs see the operating instructions for the boiler controller.

5.2 Initial startup

5.2.1 Permitted fuels

Firewood

Firewood up to max. 55 cm long.

Water content

Water content (w) greater than 15% (equivalent to wood moisture u > 17%)
Water content (w) less than 25% (equivalent to wood moisture u < 33%)

Note on standards

EU:	Fuel acc. to EN 14961 - Part 5: Firewood class A2 / D15 L50
Germany also:	Fuel class 4 (§3 of the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version)

Tips for storing wood

- Values in practice:
  - Hardwood: 2 years in dry storage
  - Soft wood: 1 year in dry storage
- Store stacks of split wood sheltered from the rain
- Create a dry underlay, where possible with air access (line with round timber, pallets, etc.)
- Use wind-exposed areas where possible for storage (e.g. store at edge of forest instead of in forest)
- Walls of buildings facing the sun are ideal
- If possible, stock fuel for the day in a warm place (e.g. in boiler room) (pre-heats the fuel!)

NOTICE! Use fuels that are consistent in size and water content.

NOTICE! Burning extremely dry fuels (w < 15%) may require repairs by qualified staff. Please contact Froling customer services or your installer.

5.2.2 Fuels permitted under certain conditions

Wood briquettes

Wood briquettes for non-industrial use with a diameter of 5-10 cm and 5-50 cm long.

Note on standards

EU:	Fuel acc. to 14961 - Part 3: Wood briquettes class B / D100 L500 Form 1 - 3
Additional for Germany:	Fuel class 5a (§3 of the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version)

Notes on use

- When burning wood briquettes use the settings for extremely dry fuel
- Wood briquettes must be heated up with firewood as per EN 14961-5 (at least two layers of firewood under the wood briquettes)
- The fuel loading chamber must not be filled more than 3/4 full, as the wood briquettes expand during combustion
- Even when using the settings for dry fuel, burning wood briquettes can cause combustion problems. In such cases, repairs must be carried out by qualified staff. Please contact Froling customer services or your installer.

5.2.3 Non-permitted fuels

The use of fuels not defined in the "Permitted fuels" section, and particularly the burning of refuse, is not permitted.

⚠ CAUTION

In case of use of non-permitted fuels:

Burning non-permitted fuels increases the cleaning requirements and leads to a build-up of aggressive sedimentation and condensation, which can damage the boiler and also invalidates the guarantee. Using non-standard fuels can also lead to serious problems with combustion.

For this reason, when operating the boiler:

❒ Only use permitted fuels

5.2.4 Heating up for the first time

NOTICE

If condensation escapes during the initial heat-up phase, this does not indicate a fault.

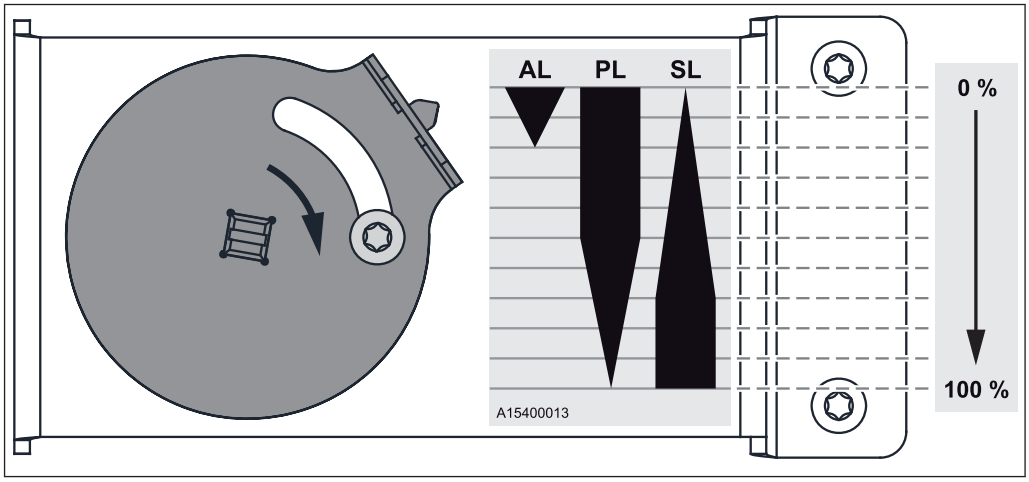
❒ Tip: If this occurs, clean up using a cleaning rag.

Boiler with Lambda control

❒ Open the insulated door and the fuel loading door
❒ Fill the fuel loading chamber for initial start-up and heat up

NOTICE! See boiler operating instructions

Boiler with manual controller

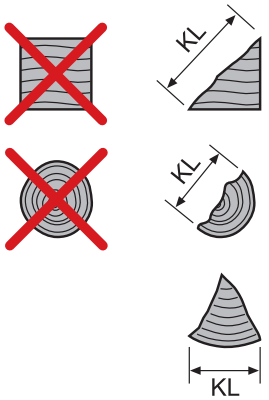


❒ Set the manual controller for the air flap as shown in the table below

NOTICE! The information below only applies to split wood and not for round timber, square timber etc.

Soft wood				Hardwood			
long split wood		short split wood		long split wood		short split wood	
w > 20%	w < 20%	w > 20%	w < 20%	w > 20%	w < 20%	w > 20%	w < 20%
20 – 30%	30 – 40%	50 – 60%	60 – 70%	20 – 30%	30 – 40%	50 – 60%	60 – 70%

If you use wood briquettes for initial start-up (only permitted under certain conditions!), you can use roughly the same settings as for short split hardwood.



The table shows the setting values for the manual controller of the air flap, which ensure a smooth start-up. The setting values for the manual controller may need to be changed during emissions measurements. These values should not therefore be used as standard values for operating the boiler!

The terms used “long split wood” (edge length EL > 10 cm) and “short split wood” (edge length EL < 10 cm) have been defined in these instructions by Froling; there is no fuel standard or similar guidelines.

❒ Open the insulated door and the fuel loading door
❒ Fill the fuel loading chamber for initial start-up and heat up

NOTICE! See boiler operating instructions

Tip: Line the first 20 cm of the fuel loading chamber with short split wood (edge length EL < 10 cm). This reduces the time taken for a bed of embers to form.

NOTICE! The smaller the wood is cut, the faster a bed of embers forms

Once the bed of embers has fully formed, the combustion air can be readjusted if necessary after measuring the O_2content:

Setting the combustion air

The nominal heat output of the boiler is set via the primary air and adjusted to the fuel used.

The secondary air sets the O_2 content of the flue gas and thus the quality of combustion.

Therefore:

Combustion air	Effect	Setting
More primary air Less secondary air	Higher flue gas temperature, greater output Less O_2 content	Turn manual controller direction 0% (anti-clockwise)
Less primary air More secondary air	Lower flue gas temperature, lower output More O_2 content	Turn manual controller direction 100% (clockwise)

NOTICE! The manual controller should be set so that the O2 content is between 8 and 11%.

❒ Once the manual controller has been correctly set, secure it in that position

After starting up for the first time and once the combustion air has been set, the boiler is optimally set to the fuel used.

For further use of the boiler, please note the following:

- ❒ Use fuels that are consistent in size, type and water content
- ❒ If a very different type of fuel is used, get a qualified technician to check the air flap setting and adjust if necessary

6 Decommissioning

6.1 Mothballing

The following measures should be taken if the boiler is to remain out of service for several weeks (e.g. during the summer):

❒ Clean the boiler thoroughly and close the doors fully

If the boiler is to remain out of service during the winter:

❒ Have the system completely drained by a qualified technician
  ➥ Protection against frost

6.2 Disassembly

To disassemble the system, follow the steps for assembly in reverse order.

6.3 Disposal

❒ Ensure that the system is disposed of in an environmentally friendly way in accordance with waste management regulations.
❒ You can separate and clean recyclable materials and send them to a recycling centre.
❒ The combustion chamber must be disposed of as builders' waste.

7 Appendix

7.1 Pressure equipment regulation

T 027 01 04

FRÖLING
WÄRME AUS HOLZ

Ergänzung zur Montage- und Bedienungsanleitung, betreffend Druckgeräteverordnung bzw. Druckgeräterichtlinie

Bei der Montage der sicherheits- und betriebsrelevanten Anbauteile, sind folgende Normen und Anleitungen zu berücksichtigen:

Sicherheitsventil

Geprüft : DVGW entsprechend TRD 721; DIN EN 12828
Einbau entsprechend: ÖNORM EN 12828 bzw. DIN EN 12828
Nennansprechdruck : 3 bar

Thermische Ablaufsicherung

Geprüft : DIN 3440
Einbau entsprechend: EN 303-5
Ansprechtemperatur : 100°C

Einrichtung zum Ausgleich der Wasservolumenänderung

Auslegung und Einbau: ÖNORM EN 12828 bzw. DIN EN 12828

Bei der Montage des Heizkessels ist unbedingt die Montageanleitung zu beachten. Die Montage der Gesamtanlage, in die der Heizkessel eingebaut wird, ist entsprechend der ÖNORM EN 12828 bzw. DIN EN 12828 durchzuführen. Die Bedienung und Wartung des Heizkessels und dessen Sicherheitseinrichtungen sind entsprechend der Bedienungsanleitung durchzuführen. Gesetzlich wiederkehrende Überprüfungen, sind entsprechend den Landesbestimmungen durchzuführen.

Die gegenständliche Baugruppe dient der Erzeugung von Warmwasser mit einer Temperatur von nicht höher als 110°C, und wird von Hand mit festen Brennstoffen beschickt.
Sie wurde gemäß §7 Abs. 2 und gemäß der Anmerkung zu Diagramm 4 der 426. Verordnung: Druckgeräteverordnung – DGVO bzw. 97/23/EG durch die Benannte Stelle

TÜV Österreich 0408

einer Entwurfsprüfung nach Modul B1 unterzogen.

Fröling Heizkessel- und Behälterbau Ges.m.b.H, Industriestraße 12, A-4710 Grieskirchen
Telefon +43 (0) 7248 606-0 Fax +43 (0) 7248 606-600 E-mail info@froeling.com Internet www.froeling.com
Stand Dezember 2004

7.2 Technical specifications - Lambda control with partial load values

Name		S1 Turbo 15S	S1 Turbo 20
Nominal heat output / range	kW	17 / 8.4 – 17	20 / 10 - 20
Electrical connection	230V / 50Hz / fused C13A		
Power consumption at nominal load	W	40	42
Power consumption in slumber mode		3	3
Weight of boiler incl. insulation and control	kg	455	465
Total boiler capacity (water)	l	90	90
Water pressure drop (ΔT = 10 / 20 K)	mbar	3.5 / 0.5	8.3 / 1.5
Minimum boiler return temperature	°C	60	
Maximum permitted operating temperature		90	
Permitted operating pressure	bar	3	
Airborne sound level	dB(A)	< 70	
Permitted fuel as per EN 14961	Part 5: Firewood class A2 / D15 L50		
Fuel loading door dimensions (width / height)	mm	350 / 360	350 / 360
Fuel loading chamber capacity	l	80	80
Combustion time [1)] - Beech	h	4.2 - 6.0	3.5 - 5.0
Combustion time[1)] - Spruce		2.5 – 3.6	2.1 - 3.0

1. Values specified for combustion time are guideline values at nominal load and will vary depending on water content (15-25%) and fill level (80-100%)

Test report data - Lambda Control

Name		S1 Turbo 15S	S1 Turbo 20
Testing institute		TÜV Austria[1)]	TÜV Austria[1)]
Test report no.		13-UW/Wels-EX-044/5	13-UW/Wels-EX-044/6
Date of issue		20/06/2013	21/06/2013
Boiler class as per EN 303-5:2012		3	4
Boiler efficiency	%	91,8	92.0

1. TÜV Austria Services GmbH, Geschäftsbereich Umweltschutz, Am Thalbach 15, A-4600 Thalheim/Wels

Test data - Emissions in [mg/MJ][1)] (nominal load/partial load)			
Carbon monoxide (CO)	mg/MJ	142 / 682	51 / 391
Nitrogen oxide (NOx)	mg/MJ	83 / 74	88 / 84
Organic hydrocarbons (OGC)	mg/MJ	5 / 74	3 / 19
Dust	mg/MJ	8 / 10	10 / 8

1. The pollutant concentration is specified as a mass based on the energy content of the fuel fed to the combustion system in mg/MJ

Test data - Emissions in [mg/m³][1)] (nominal load/partial load)			
Carbon monoxide (CO)	mg/m³	209 / 1003	75 / 574
Nitrogen oxide (NOx)	mg/m³	121 / 109	129 / 123
Organic hydrocarbons (OGC)	mg/m³	7 / 109	5 / 28
Dust	mg/m³	14 / 12	15 / 11

1. Emissions values based on dry flue gas at standard temperature and pressure (0°C, 1013 mbar) with a volume content of oxygen of 13%

7.3 Addresses

7.3.1 Address of manufacturer

FRÖLING
Heizkessel- und Behälterbau GesmbH

Industriestraße 12
A-4710 Grieskirchen
AUSTRIA

TEL 0043 (0)7248 606 0
FAX 0043 (0)7248 606 600
INTERNET www.froeling.com

7.3.2 Address of the installer

Stamp

Operating Instructions

Firewood boiler S1 Turbo

Translation of the original German operating instructions for the operator

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

B0980113_en | Edition 02/09/2013

Froling GesmbH | A-4710 Grieskirchen, Industriestraße 12 | www.froeling.com

Table of Contents

1 General 4

1.1 S1 Turbo Product Overview 5

2 Safety 7

2.1 Hazard levels of warnings 7

2.2 Pictograms used 8

2.3 General safety information 9

2.4 Permitted uses 10

2.4.1 The Clean Air Act 1993 and Smoke Control Areas 10

2.4.2 Permitted fuels 10

Firewood 10

2.4.3 Fuels permitted under certain conditions 11

Wood briquettes 11

2.4.4 Non-permitted fuels 12

2.5 Qualification of operating staff 12

2.6 Protective equipment for operating staff 12

2.7 Design information 13

2.7.1 Installation and approval of the heating system 13

2.7.2 General information for installation room (boiler room) 13

2.7.3 Requirements for central heating water 14

2.7.4 Notes for using pressure maintenance systems 14

2.7.5 Return lift 15

2.7.6 Combination with storage tank 15

2.7.7 Chimney connection/chimney system 15

2.8 Safety devices 16

2.9 Residual risks 17

2.10 Emergency procedure 18

2.10.1 Overheating of the system 18

2.10.2 Smell of flue gas 18

2.10.3 Fire in the system 18

3 Operating the System 19

3.1 Assembly and initial startup 19

3.2 Heating the boiler 20

3.2.1 Switching on the power supply 20

3.2.2 Switching on the boiler 20

3.2.3 Before heating up the boiler 20

Reloading intervals when operating with storage tank 20

Determining the right amount of fuel 21

Fuel table 22

Fill level in boiler 22

Reloading intervals when operating without storage tank or if the storage tank is too small 22

3.2.4 Heating up the boiler 23

3.2.5 Regulating the boiler 24

3.2.6 Reloading firewood 25

4 Boiler Servicing 26

4.1 General information on servicing 26

4.2 Inspection and cleaning 28

4.2.1 Inspection 28

Checking the system pressure 28

Checking the thermal discharge safety device 28

Checking the safety valve 28

4.2.2 Cleaning 29

Removing ash 29

Cleaning the combustion grate 30

Cleaning the heat-exchanger pipes (without WOS lever) 30

4.2.3 Periodic inspection and cleaning 32

Cleaning the carbonisation gas duct 32

Checking the primary air openings 32

Cleaning the flue gas temperature sensor 33

Cleaning the flue gas pipe 33

Checking the draught controller flap 33

Cleaning the induced draught fan 34

Cleaning the heat-exchanger pipes (with WOS lever - optional) 35

Checking the seal on the doors 37

Positioning the doors 38

4.3 Emissions measurement by chimney sweep or regulatory body 39

4.3.1 Measuring at rated load in firewood mode 39

4.4 Maintenance agreement / Customer service 39

4.5 Replacement parts 40

4.6 Disposal information 40

4.6.1 Disposal of the ash 40

4.6.2 Disposal of system components 40

5 Troubleshooting 41

5.1 Carbonisation gas duct flap is stiff 41

5.2 General fault with power supply 42

5.2.1 Behaviour of system after a power failure 42

5.3 Excessive temperature 42

5.4 Faults with fault message 43

5.4.1 Procedure for fault messages 43

5.4.2 Acknowledging a fault message 43

6 Appendix 44

6.1 Addresses 44

6.1.1 Address of manufacturer 44

6.1.2 Address of the installer 44

USER MANUAL FOR BATCH FED INDEPENDENT WOOD LOG FIRED BOILERS

SUPPLEMENTARY OPERATING INSTRUCTIONS FOR THE UK MARKET TO BE READ IN CONJUNCTION WITH THOSE IN THE INSTRUCTION BOOKLET

READ THE INSTRUCTION BOOK AND THESE INSTRUCTIONS CAREFULLY BEFORE USING THE BOILER

WARNING NOTE

Properly installed, operated and maintained this stove will not emit fumes into the dwelling. Occasional fumes from de-ashing and re-fuelling may occur. However, persistent fume emission is potentially dangerous and must not be tolerated. If fume emission does persist, then the following immediate action should be taken: -

(a) Open doors and windows to ventilate the room and then leave the premises.

(b) Let the fire go out.

(c) Check for flue or chimney blockage and clean if required

(d) Do not attempt to relight the fire until the cause of the fume emission has been identified and corrected. If necessary seek expert advice.

The most common cause of fume emission is flueway or chimney blockage. For your own safety these must be kept clean at all times.

IMPORTANT NOTES

General

Before lighting the boiler check with the installer that the installation work and commissioning checks described above have been carried out correctly and that the chimney has been swept clean, is sound and free from any obstructions. As part of the boilers' commissioning and handover the installer should have shown you how to operate the boiler correctly.

Do not light the boiler if there is a possibility that any part of the heating system may be frozen

Please make sure the ash-pit door and the hopper lid/charging door are firmly closed at all times whilst the boiler is in operation.

CO Alarm

Your installer should have fitted a CO alarm in the same room as the appliance. If the alarm sounds unexpectedly, follow the instructions given under "Warning Note" above.

Boiler Access

Access to the boiler should be restricted for children, aged and/or infirm persons by way of a lockable door to the room in which the boiler is installed.

Chimney cleaning

The chimney should be swept at least twice a year. It is important that the flue connection and chimney are swept prior to lighting up after a prolonged shutdown period. Where the chimney is believed to have a served

an open fire installation it is possible that the higher flue gas temperature from a closed appliance may loosen deposits that were previously firmly adhered, with the consequent risk of flue blockage. It is therefore recommended that the chimney be swept a second time within a month of regular use after installation.

In situations where it is not possible to sweep through the boiler the installer will have provided alternative means, such as a soot door. After sweeping the chimney the boiler flue outlet and the flue pipe connecting the boiler to the chimney must be cleaned with a flue brush.

Periods of Prolonged Non-Use

If the boiler is to be left unused for a prolonged period of time then it should be given a thorough clean to remove ash and unburned fuel residues. Empty the hopper of unburned fuel. To enable a good flow of air through the appliance to reduce condensation and to avoid door seals becoming stuck and subsequently damaged, leave the filling hatch and combustion chamber doors slightly ajar. These actions will reduce the possibility of unnecessary damage and corrosion.

Extractor fan

There must not be an extractor fan fitted in the same room as the boiler as this can cause the boiler to emit smoke and fumes into the room

Aerosol sprays

Do not use an aerosol spray on or near the boiler when it is alight.

Use of operating tools

Always use the operating tools provided when handling parts likely to be hot when the boiler is in use.

Chimney Fires

If the chimney is thoroughly and regularly swept, chimney fires should not occur. However, if a chimney fire does occur turn off the boiler immediately and isolate the mains electricity supply, and tightly close the doors of the boiler. This should cause the chimney fire to go out. If the chimney fire does not go out when the above action is taken then the fire brigade should be called immediately. Do not relight the boiler until the chimney and flue ways have been cleaned and examined by a professional.

Permanent air vent

The boiler requires a permanent and adequate air supply in order for it to operate safely and efficiently.
In accordance with current Building Regulations the installer may have fitted a permanent air supply vent into the room in which the boiler is installed to provide combustion air. This air vent should not under any circumstances be shut off or sealed.

USER OPERATING INSTRUCTIONS

Please read the important notices given above before referring to the main instruction book for detailed operating instructions.

Frequency of cleaning ash and residues from combustion chamber and ash-box

The owner is required to regularly carry out this cleaning operation and the frequency will depend on the heating load. When first put to use the boiler should be checked on a daily basis and experience will show how often this will eventually be required. Remember also that during the main heating season the cleaning interval will shorten as the load on the boiler will be higher.

Recommended fuels

The boiler is designed to burn wood logs only as detailed in the main instruction book. Under no circumstances should you attempt to burn any other type of fuel.

General Maintenance

It is important that any glass or other decorative surfaces are kept clean using the appropriate cleaning materials and techniques as to not damage the internal or external finishes of the boiler.

Spare Parts

For more information on obtaining spare parts, please revert to the specific page of the manufacturer's original instruction manual or contact details provided.

HETAS Ltd Approval

This appliance has obtained HETAS Ltd approval for burning wood logs only as specified in the main instruction manual. Approval does not cover the use of other fuels either alone or mixed with the recommended fuel, nor does it cover instructions for the use of other fuels.

1 General

Thank you for choosing a quality product from Fröling. The product features a state-of-the-art design and conforms to all currently applicable standards and testing guidelines.

Please read and observe the documentation provided and always keep it close to the system for reference. Observing the requirements and safety information in the documentation makes a significant contribution to safe, appropriate, environmentally friendly and economical operation of the system.

The constant further development of our products means that there may be minor differences from the pictures and content. If you discover any errors, please let us know: doku@froeling.com.

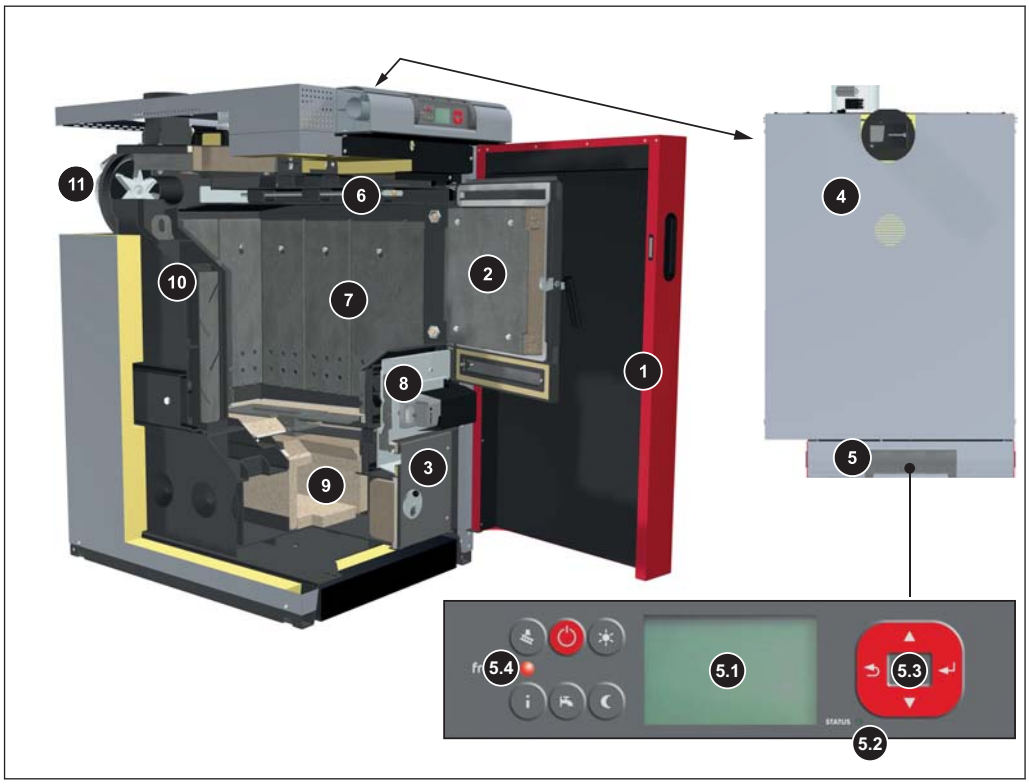
Subject to technical change.

Guarantee conditions

Our sale and delivery conditions generally apply. These conditions have been made available to customers, and customers have been made aware of them at the time of order completion.

You can also find the guarantee conditions on the enclosed guarantee certificate.

1.1 S1 Turbo Product Overview



1	Insulated door	3	Combustion chamber door with inspection glass
2	Fuel loading door	4	Controller cover
5	Lambdatronic S 3200 S1 boiler controller		
5.1	Visual display showing operating statuses and parameters		
5.2	Status LED to display the operating status: - GREEN constant: BOILER ACTIVE (heating up/heating) - GREEN flashing (interval: 5 sec OFF, 1 sec ON): OFF - ORANGE flashing: WARNING - RED flashing: FAULT		
5.3	Navigation keys to move around in the menus and to change the parameter values		
5.4	Function keys to call up individual boiler functions directly **NOTICE! For key layout see operating instructions for boiler controller**		
6	Carbonisation gas duct flap	9	Combustion chamber
7	Cladding plates	10	WOS (Efficiency Optimisation System)
8	Servo-motor/manual adjuster	11	Induced draught fan

Under the insulating cover (4):

12	Main switch
13	High-limit thermostat (STL)
14	Service interface (RS232)

2 Safety

2.1 Hazard levels of warnings

This documentation uses warnings with the following hazard levels to indicate direct hazards and important safety instructions:

⚠ DANGER

The dangerous situation is imminent and if measures are not observed it will lead to serious injury or death. You must follow the instructions!

⚠ WARNING

The dangerous situation may occur and if measures are not observed it will lead to serious injury or death. Work with extreme care.

⚠ CAUTION

The dangerous situation may occur and if measures are not observed it will lead to minor injuries or damage to property.

2.2 Pictograms used

The following symbols are used in the documentation and/or on the boiler to show what is required and forbidden and to give warnings.

In accordance with the Machinery Directive, signs fitted directly within the danger area of the boiler indicate immediate hazards or safety procedures. These stickers must not be removed or covered.

Refer to the operating instructions

Wear safety shoes

Wear protective gloves

Turn off the main switch

Keep the doors closed

Unauthorised access prohibited

Warning - hot surface

Warning - hazardous electrical voltage

Warning - hazardous or irritant materials

Warning - automatic boiler start-up

Warning of injury to fingers or hands, automatic fan

2.3 General safety information

⚠ DANGER

If the device is used incorrectly:

Incorrect use of the system can cause severe injury and damage.

When operating the system:

- ❒ Observe the instructions and information in the manuals
- ❒ Observe the details on procedures for operation, maintenance and cleaning, as well as troubleshooting in the individual manuals.
- ❒ Any work above and beyond this should be carried out by authorised heating engineers or by Froling customer services.

⚠ WARNING

External influences:

Negative external influences, such as insufficient combustion air or non-standard fuel, can cause serious faults in combustion (e.g. spontaneous combustion of carbonisation gases or flash fires) which can in turn cause serious accidents!

When operating the boiler, please note the following:

- ❒ Instructions and information regarding versions and minimum values, as well as standards and guidelines for heating components in the instructions must be observed.

⚠ WARNING

Severe injuries and damage can be caused by an inadequate flue gas system.

Problems with the flue gas system, such as poor cleaning of the flue pipe or insufficient chimney draught, can cause serious faults in combustion (such as spontaneous combustion of carbonisation gases or flash fires).

Take the following precautions:

- ❒ Optimum boiler performance can only be guaranteed if the flue gas system is functioning correctly.

2.4 Permitted uses

The Froling Firewood boiler S1 Turbo is designed solely for heating domestic water. Only use fuels specified in the "Permitted fuels" section.

⇨ See "Permitted fuels" [page 10]

The unit should only be operated when it is in full working order. It should be operated in accordance with the instructions, observing safety precautions, and you should ensure you are aware of the potential hazards. The inspection and cleaning intervals in the operating instructions should be observed. Ensure that any faults which might impair safety are rectified immediately.

The manufacturer or supplier is not liable for any damage resulting from non-permitted uses.

2.4.1 The Clean Air Act 1993 and Smoke Control Areas

Under the Clean Air Act local authorities may declare the whole or part of the district of the authority to be a smoke control area. It is an offence to emit smoke from a chimney of a building, from a furnance or from any fixed boiler if located in a designated smoke control area. It is also an offence to acquire an „unauthorised fuel“ for use within a smoke control area unless it is used in an „exempt“appliance („exempted“ from the controls which generally apply in the smoke control area). The Secretary of State for Environment, Food and Rural Affairs has powers under the Act to authorise smokeless fuels or exempt appliances for use in smoke control areas in England. In Scotland and Wales this power rests with Ministers in the devolved administrations for those countries. Separate legislation, the Clean Air (Northern Ireland) Order 1981, applies in Northern Ireland. Therefore it is a requirement that fuels burnt or obtained for use in smoke control areas have been „authorised“ in Regluations and that appliances used to burn solid fuel in those areas (other than „authorised“ fuels) have been exempted by an Order made and signed by the Secretary of State or Minister in the devolved administrations.

Further information on the requirements of the Clean Air Act can be found here: http://smokecontrol.defra.gov.uk

Your local authority is responsible for implementing the Clean Air Act 1993 including designation and supervision of smoke control areas and you can contact them for details of Clean Air Act requirements.

2.4.2 Permitted fuels

Firewood

Firewood up to max. 55 cm long.

Water content

Water content (w) greater than 15% (equivalent to wood moisture u > 17%) Water content (w) less than 25% (equivalent to wood moisture u < 33%)

Note on standards

EU:	Fuel acc. to EN 14961 - Part 5: Firewood class A2 / D15 L50
Germany also:	Fuel class 4 (§3 of the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version)

Tips for storing wood

- Values in practice:
  - Hardwood: 2 years in dry storage
  - Soft wood: 1 year in dry storage
- Store stacks of split wood sheltered from the rain
- Create a dry underlay, where possible with air access (line with round timber, pallets, etc.)
- Use wind-exposed areas where possible for storage (e.g. store at edge of forest instead of in forest)
- Walls of buildings facing the sun are ideal
- If possible, stock fuel for the day in a warm place (e.g. in boiler room) (pre-heats the fuel!)

NOTICE! Use fuels that are consistent in size and water content.

NOTICE! Burning extremely dry fuels (w < 15%) may require repairs by qualified staff. Please contact Froling customer services or your installer.

2.4.3 Fuels permitted under certain conditions

Wood briquettes

Wood briquettes for non-industrial use with a diameter of 5-10 cm and 5-50 cm long.

Note on standards

EU:	Fuel acc. to 14961 - Part 3: Wood briquettes class B / D100 L500 Form 1 - 3
Additional for Germany:	Fuel class 5a (§3 of the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version)

Notes on use

- When burning wood briquettes use the settings for extremely dry fuel
- Wood briquettes must be heated up with firewood as per EN 14961-5 (at least two layers of firewood under the wood briquettes)
- The fuel loading chamber must not be filled more than 3/4 full, as the wood briquettes expand during combustion
- Even when using the settings for dry fuel, burning wood briquettes can cause combustion problems. In such cases, repairs must be carried out by qualified staff. Please contact Froling customer services or your installer.

2.4.4 Non-permitted fuels

The use of fuels not defined in the "Permitted fuels" section, and particularly the burning of refuse, is not permitted.

⚠ CAUTION

In case of use of non-permitted fuels:

Burning non-permitted fuels increases the cleaning requirements and leads to a build-up of aggressive sedimentation and condensation, which can damage the boiler and also invalidates the guarantee. Using non-standard fuels can also lead to serious problems with combustion.

For this reason, when operating the boiler:

❒ Only use permitted fuels

2.5 Qualification of operating staff

⚠ CAUTION

If unauthorised persons enter the installation room / boiler room:

Risk of personal injury and damage to property

❒ The operator is responsible for keeping unauthorised persons, in particular children, away from the system.

Only trained operators are permitted to operate the unit. The operator must also have read and understood the instructions in the documentation.

2.6 Protective equipment for operating staff

You must ensure that staff have the protective equipment specified by accident prevention regulations.

- For operation, inspection and cleaning:
  - suitable work wear
  - protective gloves
  - sturdy shoes

2.7 Design information

It is forbidden to carry out modifications to the boiler or to change or deactivate safety equipment.

Always comply with all fire, building, and electrical regulations when installing or operating the boiler system, and follow the operating instructions and mandatory regulations that apply in the country in which the boiler is operated.

2.7.1 Installation and approval of the heating system

The boiler should be operated in a closed heating system. The following standards govern the installation:

Note on standards

ÖNORM / DIN EN 12828 Heating Systems in Buildings

NOTICE! Each heating system must be officially approved.

The appropriate supervisory authority (inspection agency) must always be informed when installing or modifying a heating system, and authorisation must be obtained from the building authorities:

Austria: Inform the civic/municipal building authorities.

Germany: Notify an approved chimney sweep and the building authorities.

2.7.2 General information for installation room (boiler room)

Boiler room characteristics

- There must not be a potentially explosive atmosphere in the boiler room as the boiler is not suitable for use in potentially explosive environments.
- The boiler room must be frost-free.
- The boiler does not provide any light, so the customer must provide sufficient lighting in the boiler room in accordance with national workplace design regulations.
- When using the boiler over 2000 metres above sea level you should consult the manufacturer.
- Danger of fire due to flammable materials.
  No flammable materials should be stored near the boiler. Flammable objects (e.g. clothing) must not be put on the boiler to dry.
- Damage due to impurities in combustion air.
  Do not use any solvents or cleaning agents containing chlorine in the room where the boiler is installed.
- Keep the air suction opening of the boiler free from dust.

Ventilation of the boiler room

Ventilation air for the boiler room should be taken from and expelled directly outside, and the openings and air ducts should be designed to prevent weather conditions (foliage, snowdrifts, etc.) from obstructing the air flow.

Unless otherwise specified in the applicable building regulations for the boiler room, the following standards apply to the design and dimensions of the air ducts:

Note on standards

ÖNORM H 5170 - Construction and fire protection requirements

2.7.3 Requirements for central heating water

The following standards and guidelines apply:

Note on standards

Austria:	ÖNORM H 5195-1
Germany:	VDI 2035
Switzerland:	SWKI 97-1
Italy:	D.P.R. no. 412

NOTICE! Note on filling with make-up water: Always bleed the filling hose before connecting, in order to prevent air from entering the system.

Observe the standards and also follow the recommendations below:

- ❒ Max. cumulative value for alkaline earth: 1.0 mmol/l or 100 mg/l (corresponds to 5.6 dH)
- ❒ Use softened water as the make-up water
- ❒ Avoid leaks and use a closed heating system to maintain water quality during operation

2.7.4 Notes for using pressure maintenance systems

Pressure maintenance systems in hot-water heating systems keep the required pressure within predefined limits and balance out volume variations caused by changes in the hot-water temperature. Two main systems are used:

Compressor-controlled pressure maintenance

In compressor-controlled pressure maintenance units, a variable air cushion in the expansion tank is responsible for volume compensation and pressure maintenance. If the pressure is too low, the compressor pumps air into the tank. If the pressure is too high, air is released by means of a solenoid valve. The systems are built solely with closed-diaphragm expansion tanks to prevent the damaging introduction of oxygen into the domestic hot water.

Pump-controlled pressure maintenance

A pump-controlled pressure maintenance unit essentially consists of a pressure-maintenance pump, relief valve and an unpressurised receiving tank. The valve releases hot water into the receiving tank if the pressure is too high. If the pressure drops below a preset value, the pump draws water from the receiving tank and feeds it back into the heating system. Pump-controlled pressure maintenance systems with **open expansion tanks** (e.g. without a diaphragm) introduce ambient oxygen via the surface of the

water, exposing the connected system components to the risk of corrosion. These systems offer no oxygen removal for the purposes of corrosion control as required by VDI 2035 and **in the interests of corrosion protection should not be used**.

2.7.5 Return lift

If the hot water return is below the minimum return temperature, some of the hot water outfeed will be mixed in.

⚠ CAUTION

Risk of dropping below dew point/condensation formation if operated without return temperature control.

Condensation water forms an aggressive condensate when combined with combustion residue, leading to damage to the boiler.

Take the following precautions:

❒ Regulations stipulate the use of a return temperature control.

➥ The minimum return temperature is 60 °C. We recommend fitting some sort of control device (e.g. thermometer).

2.7.6 Combination with storage tank

You can find more detailed information about storage tank design in the boiler assembly instructions.

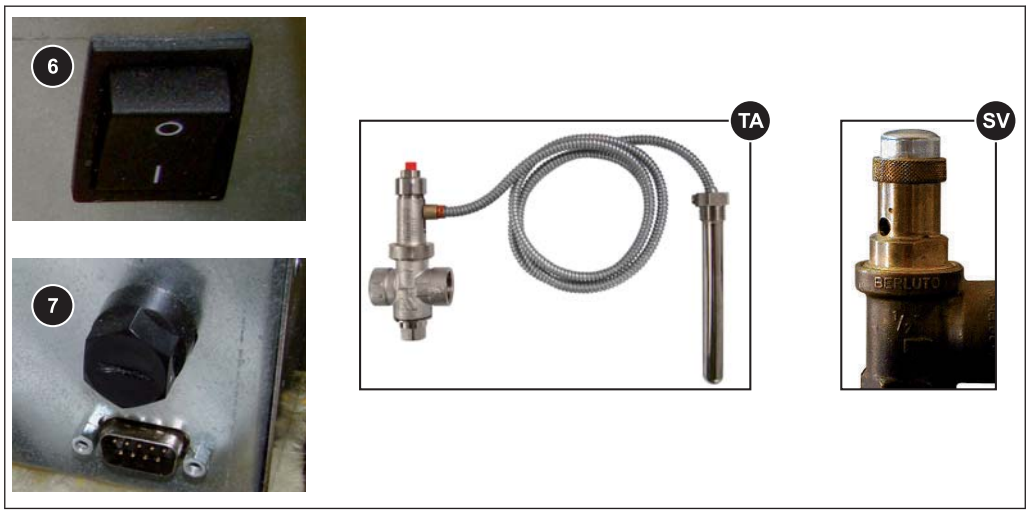
NOTICE! See "Design Information" section in the assembly instructions S1 Turbo

2.7.7 Chimney connection/chimney system

EN 303-5 specifies that the entire flue gas system must be designed to prevent, wherever possible, damage caused by seepage, insufficient feed pressure and condensation. Please note in this respect that flue gas temperatures lower than 160K above room temperature can occur in the permitted operating range of the boiler.

NOTICE! Please see the technical data contained in the assembly instructions for further information about standards and regulations as well as the flue gas temperatures when clean and the other flue gas values!

2.8 Safety devices



6	**MAIN SWITCH** *(switches off the power supply)* Before cleaning work in/on the boiler: ❒ Turn off the main switch ➥ The power to all components is switched off. ➥ **WARNING!** Only switch off the boiler when the fuel has burnt down and the boiler has cooled off.
7	**HIGH-LIMIT THERMOSTAT (STL)** *(protection against overheating)* The STL switches off the combustion system when the boiler reaches approx. 105°C. The pumps continue to run. Once the temperature falls below approx. 75°C, the STL can be reset mechanically.
TA	**THERMAL DISCHARGE VALVE (TA)** *(protection against overheating)* The thermal discharge valve opens at approx. 100°C and feeds cold water to the safety heat exchanger to lower the boiler temperature
SV	**SAFETY VALVE** *(protection against overheating/excess pressure)* When the boiler pressure reaches a maximum of 3 bar, the safety valve opens and the heated water is blown off in the form of steam.

2.9 Residual risks

⚠ WARNING

When the main switch is switched off in heating mode:

The boiler is not controlled. Any resulting boiler malfunctions can cause serious injury and damage.

Take the following precautions:

❒ Allow the fire to burn out completely and let the boiler cool

➥ ID fan switches off when "Off" status has been reached (flue gas temperature < 80°C, boiler temperature < 65°C)

❒ Only then is it safe to switch off the main switch

⚠ WARNING

When touching hot surfaces:

Severe burns are possible on hot surfaces and the flue gas pipe!

When work is carried out on the boiler:

❒ Shut down the boiler in a controlled way (operating status "Off") and allow it to cool down

❒ Protective gloves must generally be worn for work on the boiler, and it should only be operated using the handles provided

❒ Insulate the flue pipes or simply avoid touching them during operation.

⚠ WARNING

When inspecting and cleaning the boiler with the main switch on:

Serious injuries possible due to boiler/individual components starting up automatically (induced draught)!

Before inspection and cleaning work in/on the boiler:

❒ Allow the fuel in the boiler to burn off

❒ Allow boiler to cool off and switch off main switch

⚠ WARNING

If non-permitted fuel types are used:

Non-standard fuels can cause serious faults in combustion (e.g. spontaneous combustion of carbonisation gases / flash fires) which can lead to serious accidents!

Take the following precautions:

❒ Only use fuels specified in the "Permitted fuels" section of these operating instructions.

2.10 Emergency procedure

2.10.1 Overheating of the system

If the system overheats and the safety devices fail, proceed as follows:

NOTICE! Do not under any circumstances switch off the main switch or disconnect the power supply.

- ❒ Keep all the doors on the boiler closed
- ❒ Open all mixing valve taps, switch on all pumps.
  - ➥ The Froling heating circuit control performs this function in automatic operation.
- ❒ Leave the boiler room and close the door
- ❒ Open any available radiator thermostat valves

If the temperature does not drop:

- ❒ Contact the installer or Froling customer services
  ⇨ See "Addresses" [page 44]

2.10.2 Smell of flue gas

DANGER

If you smell flue gas in the boiler room:

Inhaling toxic flue gas can be fatal!

If you smell flue gas in the room where the boiler is installed:

- ❒ Keep all the doors on the boiler closed
- ❒ Shut down the boiler according to procedure
- ❒ Ventilate the room where the boiler is installed
- ❒ Close the fire door and doors to living areas

2.10.3 Fire in the system

DANGER

In case of fire in the system:

Risk of death by fire and poisonous gases

Emergency procedure in case of fire:

- ❒ Leave the boiler room
- ❒ Close the doors
- ❒ Inform the fire department

3 Operating the System

3.1 Assembly and initial startup

Assembly, installation and initial startup of the boiler must only be carried out by qualified staff, and these procedures are described in the accompanying assembly instructions.

NOTICE! See assembly instructions for the S1 Turbo

NOTICE

Optimum efficiency and efficient, low-emission operation can only be guaranteed if the system is set up by trained professionals and the standard factory settings are observed.

Take the following precautions:

❒ Initial startup should be carried out with an authorised installer or with Froling customer services

The individual steps for initial start-up are explained in the operating instructions for the controller

NOTICE! See operating instructions for the Lambdatronic S 3200 S1

The customer is responsible for ensuring the following prior to initial start-up of the system by Froling customer services:

- Electrical installation
- Installation of water pipes
- Flue gas connection including all insulation work
- Work must comply with local fire protection regulations

- It is essential that the electrician who has carried out the installation work is available when starting up the system for the first time to make any changes to the wiring which may become necessary.
- During initial start-up, operating staff are shown how to use the boiler. It is imperative for proper handover of the product that those involved are present as this is a one-off opportunity.

NOTICE

If condensation escapes during the initial heat-up phase, this does not indicate a fault.

❒ Tip: If this occurs, clean up using a cleaning rag.

3.2 Heating the boiler

3.2.1 Switching on the power supply

❒ Turn on the main switch
  ➥ There is voltage at all of the boiler's components
  ➥ When the control has completed the system start, the boiler is ready for operation

3.2.2 Switching on the boiler

❒ Press the standby key
  ➥ Automatic mode is active
  ➥ The heating system is controlled via the controller according to the selected mode in automatic mode
❒ For other modes press the relevant function key
  ➥ Information on function keys in the relevant operating instructions for the "Lambdatronic S 3200 S1" boiler controller
❒ Switch the boiler on by tapping “Boiler ON”
  ➥ Automatic mode is active
  ➥ The heating system is controlled via the controller according to the selected mode in automatic mode
❒ For other modes press the relevant function key
  ➥ Information on function keys in the relevant operating instructions for the "Lambdatronic S 3200" boiler controller

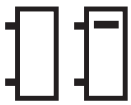
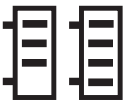
NOTICE! The storage tank can be loaded in all operating modes to ensure constant heat consumption.

3.2.3 Before heating up the boiler

Reloading intervals when operating with storage tank

Reloading intervals and amounts should be determined exclusively according to the storage tank for efficient and environmentally-friendly heating.

❒ Check the store load status on the display

Load status	Procedure
	No bars or one bar in the store load status means that the storage tank needs to be heated up by approx. 35°C. ⇨ See "Determining the right amount of fuel" [page 21]
	Two bars in the store load status mean that the storage tank needs to be heated up by approx. 20°C. ⇨ See "Determining the right amount of fuel" [page 21]
	Three or four bars in the store load status mean that the storage tank cannot take any more heat, or only a small amount. In this case do not add fuel!

Determining the right amount of fuel

The amount of fuel added should allow the storage tank to be constantly heated to the max. storage tank temperature (= boiler target temperature). Please note that the amount to reload also depends on the type of fuel.

Example: Heat a 2000 litre storage tank by 30°C

The calculation below only takes into account the storage tank. It does not take into account the boiler efficiency, pipe losses and the energy required to heat the boiler and heating system.

Assumption: The storage tank currently has a temperature of 50°C and should be heated to 80°C. The calculation below shows how much fuel is required for heating. First we calculate the energy required:

As the medium to be heated is water and the mass is roughly the same as the volume (2000 litres = 2000 kg), we can use the simplified formula Q = m x c x Δt.

Q = energy required
m = mass of the medium to be heated
c = heat capacity of the medium to be heated (constant for water)
Δt = temperature difference between start and end temperature[1)]

Mass (m) x heat capacity (c) x temperature difference (Δt) = energy (Q)
2000 kg x 1.163 Wh/kgK x 30 K = 69 780 Wh
69 780 Wh = **69.8 kWh**

Heating a 2000 litre storage tank from 50°C to 80°C requires approx. 69.8 kWh of energy.

1. Temperature difference in Kelvins (K). As these are not absolute temperatures the value can be entered in degrees Celsius (°C). (30°C equals 30°K)

The amount of fuel can now be calculated from the energy required:

For our sample calculation we used beech with a water content w=20%. The energy content of the fuel varies according to the type of wood and the water content. (⇨ See "Fuel table" [page 22])

Energy required = 69.8 kWh (from calculation above)
Energy content of fuel = 3.8 kWh/kg (beech, w=20%)

Energy required / energy content of fuel = amount of fuel
69.8 kWh / 3.8 kWh/kg = **18.4 kg**

Approx. 18.4 kg beech wood (w=20%) is required to heat a 2000 litre storage tank from 50 °C to 80 °C.

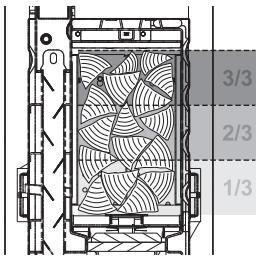
Fuel table

The table below shows a selection of wood types with the corresponding energy content depending on the water content:

Wood type	Energy content with water content [kWh/kg]		
	w = 15%	w = 20%	w = 25%
Spruce	4.3	4.0	3.7
Pine	4.3	4.0	3.7
Beech	4.1	3.8	3.5
Oak	4.1	3.8	3.5

Fill level in boiler

The table below shows the relationship between fill level and weight. It compares beech (example of hardwood) and spruce (example of soft wood) with a water content of approx. 20%. Using our example above with beech, the fill level of an S1 Turbo 15 would, therefore, be approximately two-thirds.



Fill level		Weight at fill level
		S1 Turbo 15/20
3/3	Beech	approx. 28 kg
	Spruce	approx. 17 kg
2/3	Beech	approx. 19 kg
	Spruce	approx. 12 kg
1/3	Beech	approx. 9 kg
	Spruce	approx. 6 kg

Reloading intervals when operating without storage tank or if the storage tank is too small

NOTICE

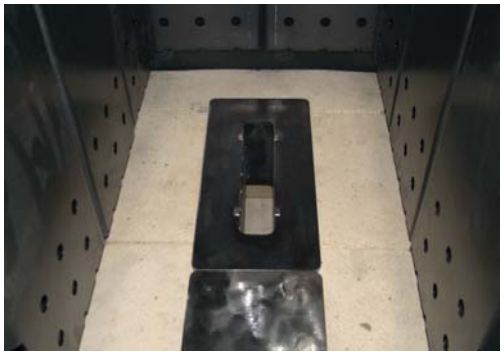
Feed based on output:

Only replenish the fuel if energy is needed!

❒ If too much fuel is loaded, the boiler drops below its minimum output limit and goes over to "constant burn" operating status (blower fan switches off)

➥ The level of efficiency drops in constant burn mode, the emissions increase and the boiler can tar up (pitch formation!)

3.2.4 Heating up the boiler



❒ Open the insulated door and the fuel loading door

❒ Check the ash level in the combustion chamber and clean if necessary

➥ Recommendation: Do not remove the ash in the combustion chamber each time you heat up the boiler, only when the middle row of holes in the cladding plates is no longer visible. This protects the combustion chamber and makes the heating-up process more efficient.

❒ Add one layer of firewood

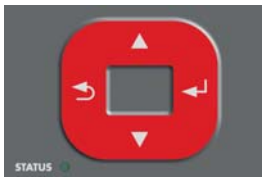
➥ Use firewood with a length of approximately 50 cm and arrange it lengthwise

➥ Do not cover the flame slot entirely

❒ Place some scrunched-up paper at the front against the fuel loading door

❒ Cover the first layer of firewood with cardboard
❒ Fill the fuel loading chamber in accordance with the output
⇨ See "Determining the right amount of fuel" [page 21]

❒ Close the carbonisation gas duct flap by pulling out the lever
  ➥ The carbonisation gas duct is closed to provide a better draught during the heating-up process
❒ Light the paper



If the negative pressure from the induced draught fan is too strong for the firing material to be ignited:
❒ Press the Down arrow in the navigation keys (6.3) briefly
  ➥ The induced draught fan switches off
❒ Light the firing material
❒ Press the Up arrow in the navigation keys (6.3) briefly
  ➥ The induced draught fan switches on

❒ Leave the fuel loading door open for approximately 5 minutes
  ➥ A bed of embers forms
❒ Close the fuel loading door
  ➥ The flue gas temperature must be > 130°C

3.2.5 Regulating the boiler

For the necessary steps, and how to display and alter parameters:

NOTICE! See operating instructions for boiler controller!

3.2.6 Reloading firewood

⚠ WARNING

When reloading firewood when the boiler is hot:

Risk of injury from handling firewood or of burns from hot surfaces.

By the nature of its operation, the surfaces and operating elements get hot! There is also a risk of injury from splinters when working with firewood.

❒ When working on the boiler during operation, particularly when reloading fuel, always wear protective gloves.

⚠ WARNING

Opening the fuel loading door

can cause injury, damage and smoke!

❒ Open the fuel loading door slowly and with care

❒ Close the fuel loading door again immediately after checking/reloading

If additional heat is required by connected heating systems (e.g. storage tank too cold, storage tank not yet fully loaded, etc.) proceed as follows:

❒ Slowly open the insulated door and fuel loading door and check the fuel

If the fuel in the boiler has burnt down:

❒ Refill with fuel

⇨ See "Determining the right amount of fuel" [page 21]

If there is enough fuel in the boiler:

❒ Close the fuel loading door immediately

4 Boiler Servicing

4.1 General information on servicing

⚠ DANGER

When working on electrical components:

Risk of electrocution!

When work is carried out on electrical components:

- ❒ Only have work carried out by a qualified electrician
- ❒ Observe the applicable standards and regulations

  ➥ Work must not be carried out on electrical components by unauthorised persons

⚠ WARNING

During inspection and cleaning work on the hot boiler:

Hot parts and the flue spigot can cause serious burns!

- ❒ Always wear protective gloves when working on the boiler
- ❒ Only operate the boiler using the handles provided
- ❒ Before inspection and cleaning work in/on the boiler, allow the fuel in the boiler to burn off
- ❒ Allow boiler to cool off and switch off main switch

⚠ WARNING

When inspecting and cleaning the boiler with the main switch on:

Serious injuries possible due to boiler/individual components starting up automatically (induced draught)!

Before inspection and cleaning work in/on the boiler:

- ❒ Allow the fuel in the boiler to burn off
- ❒ Allow boiler to cool off and switch off main switch

⚠ WARNING

Incorrect inspection and cleaning:

Incorrect or insufficient inspection and cleaning of the boiler can cause serious faults in combustion (e.g. spontaneous combustion of carbonisation gases / flash fires) and this can lead to serious accidents and damage!

Take the following precautions:

- ❒ Clean the boiler following the instructions in the instruction manual. Follow the boiler operating instructions.

NOTICE

We recommend you keep a maintenance book in accordance with ÖNORM M7510.

4.2 Inspection and cleaning

- ❒ Regular cleaning of the boiler extends its life and is a basic requirement for smooth running.
- ❒ Recommendation: use an ash vacuum for cleaning.

4.2.1 Inspection

Checking the system pressure

- ❒ Check the system pressure on the pressure gauge
  - ➥ The value must be 20% above the pre-stressed pressure of the expansion tank
    NOTICE! Check that the position of the pressure gauge and rated pressure of the expansion tank match your installer's specifications!

If the system pressure decreases:

- ❒ Top up with water
  NOTICE! If this happens frequently, the seal of the heating system is faulty! Inform your installer

If large pressure fluctuations are observed:

- ❒ Ask an expert to inspect the expansion tank

Checking the thermal discharge safety device

- ❒ Check the seal of the discharge valve
  - ➥ The discharge pipe must not drip
    NOTICE! Exception: Boiler temperature > 100 °C

If water is dripping from the discharge pipe:

- ❒ Clean the discharge safety device in accordance with the manufacturer's instructions or have it checked/replaced by the installer if necessary

Checking the safety valve

- ❒ Check the seal of the safety valve regularly and ensure that the valve is not dirty
  NOTICE! Inspection work must be carried out in accordance with the manufacturer's instructions.

4.2.2 Cleaning

The frequency at which the following cleaning work is carried out depends on energy requirements, fuel quality and number of operating hours.

Removing ash

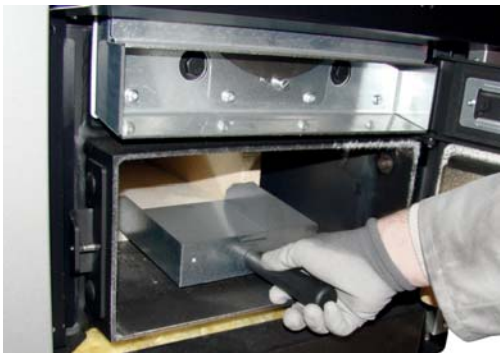
Recommendation: Do not remove the ash in the combustion chamber each time you heat up the boiler, only when the middle row of holes in the cladding plates is no longer visible. This protects the combustion chamber and makes the heating-up process more efficient.

Carry out all other cleaning work described in the Cleaning section in the same way.

❒ Open the fuel loading door and remove ash from above the combustion chamber using the ash shovel

❒ Move the remaining ash down into the combustion chamber below with the furnace tool

❒ Open the combustion chamber door



❒ Scrape the ash in the combustion chamber into the ash shovel

❒ Scrape the ash from the sides of the combustion chamber into the ash shovel

❒ Shovel the ash into the container provided

➥ Use a fire-proof container with cover

Cleaning the combustion grate

❒ Open the fuel loading door
❒ Remove the combustion grate
❒ Remove ash deposits from the combustion grate and secondary air inlets

Cleaning the heat-exchanger pipes (without WOS lever)

For boilers fitted with a WOS lever (optional):
⇨ See "Cleaning the heat-exchanger pipes (with WOS lever - optional)" [page 35]

❒ Lift off the controller cover and the side insulating mat

❒ Undo the screws and remove the cleaning lid
❒ Remove the WOS turbulators and clean them

❒ Clean the heat-exchanger pipes with the brush provided
  ➥ Push the cleaning brush all the way through before pulling it up
  ➥ The bristles cannot be turned in the pipe
❒ Clean the side passage to the flue gas pipe
  ➥ TIP: Use an ash vacuum

❒ After cleaning, reassemble the components in the reverse order

4.2.3 Periodic inspection and cleaning

The boiler must be cleaned and inspected at appropriate intervals depending on the service hours and fuel quality.

For fuels with a low ash content, annual cleaning and inspection (1000 to 1500 service hours) is usually sufficient. For less efficient fuels and fuels with a high ash content (indicated by short emptying intervals for the ash container), the work should be carried out correspondingly more frequently.

Cleaning the carbonisation gas duct

❒ Open the fuel loading door and clean the carbonisation gas duct with a small brush

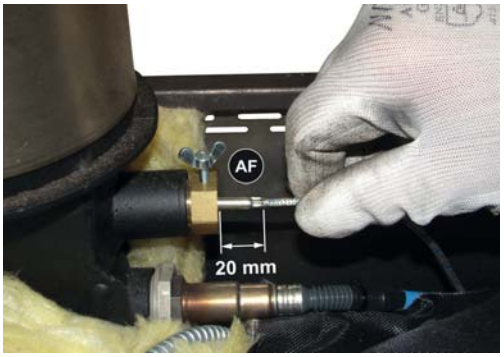
Checking the primary air openings

❒ Open the fuel loading door and unhinge the cladding plates

❒ Check the primary air openings inside the boiler for unobstructed air flow and clean if necessary

❒ Unhinge the front air guide plate
❒ Clean the air openings in the guide plate
❒ Check the air inlet inside the boiler for unobstructed air flow and clean if necessary

Cleaning the flue gas temperature sensor



❒ Release the retaining screw and take the flue gas temperature sensor (AF) out of the flue gas pipe
❒ Wipe the flue gas temperature sensor with a clean cloth
❒ Push in the flue gas temperature sensor until about 20 mm of the sensor remains protruding from the bushing and secure with fixing screw

Cleaning the flue gas pipe

❒ Switch off the induced draught fan
  ➥ This prevents damage to the fan from the cleaning brush
❒ Remove the inspection cover on the connecting pipe
❒ Clean the connecting pipe between the boiler and chimney with a chimney sweeping brush
  ➥ Depending on the layout of the flue gas pipes and the chimney draught, cleaning once a year may not be enough!

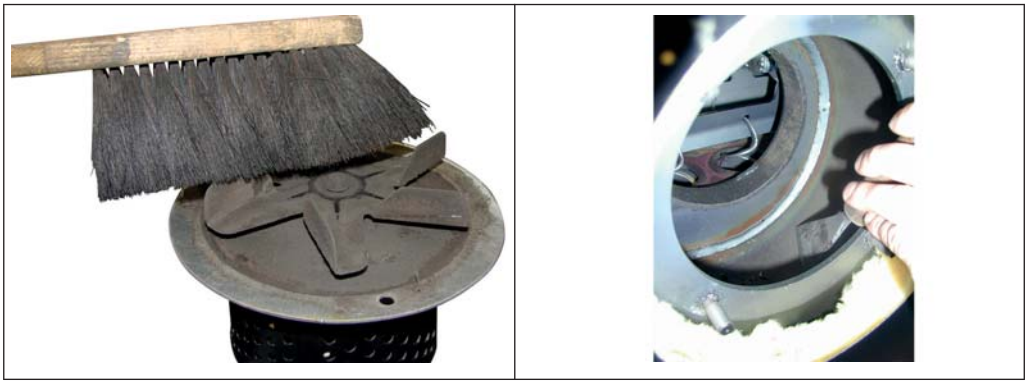
Checking the draught controller flap

❒ Check that the draught controller flap moves freely

Cleaning the induced draught fan

Check the induced draught fan for dirt and deposits and clean if necessary

Cleaning (if required)



- ❒ Unplug the connection cable of the induced draught fan
- ❒ Remove the induced draught fan from the back of the boiler
  - ➥ Take care not to damage the seal
- ❒ Check for damage
- ❒ Clean the fan wheel from the inside out using a soft brush or paint brush

- ❒ Remove dirt and deposits from the induced draught housing using a scraper
- ❒ Remove any ash which has gathered using an ash vacuum
- ❒ Fit the induced draught fan
- ❒ Plug in the connection cable and secure with cable ties

Cleaning the heat-exchanger pipes (with WOS lever - optional)

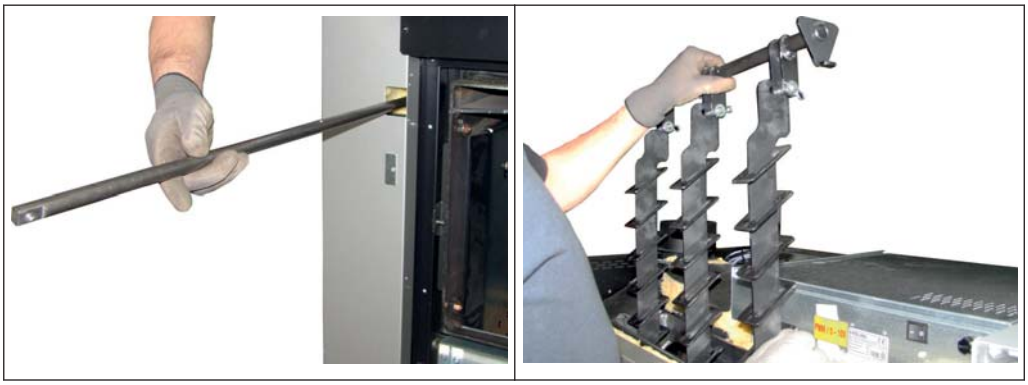
On boilers not fitted with a WOS lever, the heat-exchanger pipes will need cleaning correspondingly more often.

⇨ See "Cleaning the heat-exchanger pipes (without WOS lever)" [page 30]

❒ Lift off the controller cover and the side insulating mat

❒ Undo the screws and remove the cleaning lid
❒ Remove the cover from the front of the insulation

❒ Push the WOS lever down and remove it from the shaft
❒ Remove the pipe locking pin connecting the shaft and the stay tube



❒ Pull the shaft out of the brass bushing
❒ Remove the WOS turbulators together with the stay tube and clean them

❒ Clean the heat-exchanger pipes with the brush provided
  ➥ Push the cleaning brush all the way through before pulling it up
  ➥ The bristles cannot be turned in the pipe
❒ Clean the side passage to the flue gas pipe
  ➥ TIP: Use an ash vacuum

❒ After cleaning, reassemble the components in the reverse order

Checking the seal on the doors

The example below shows how to check the seal on the fuel loading door. The procedure is the same for checking the seal on the combustion chamber door.

❒ Insert a sheet of paper at the side of the door stop at the top between the door and the boiler

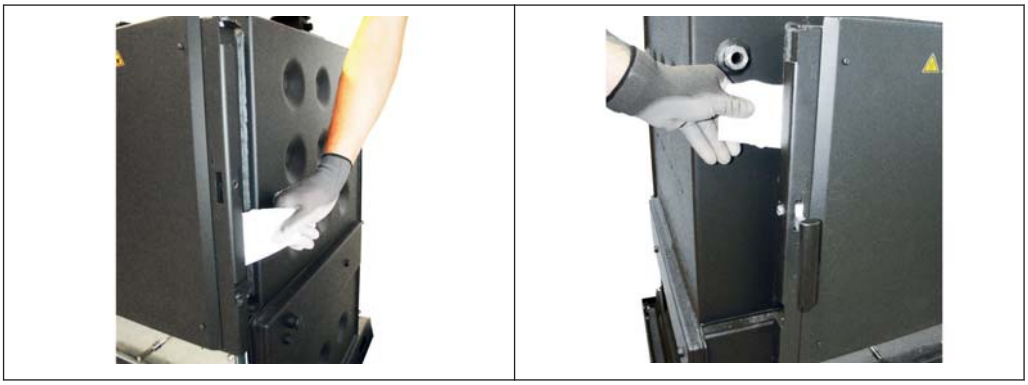
❒ Close the door

❒ Try to pull out the sheet of paper

➥ If the paper cannot be removed:
The door seal is OK and the settings are correct

➥ If the paper can be removed:
The door seal is not OK and will need to be reset
Increase the contact pressure at the locking cam:
⇨ See "Positioning the doors" [page 38]

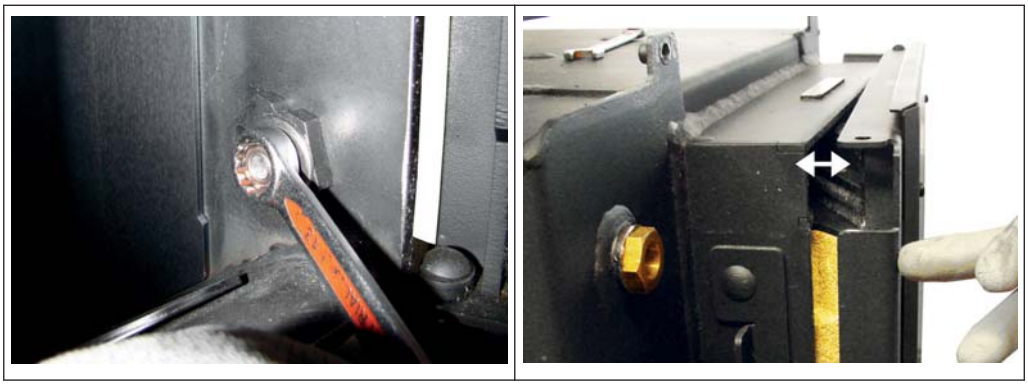
❒ Check the seal again after positioning the doors



❒ Repeat the procedure at the side of the door stop at the bottom and at the side of the door handle

Positioning the doors

The example below shows how to position the fuel loading door. The procedure is the same for positioning the combustion chamber door.



❒ Using an Allen key (13 mm), loosen the lock nuts on the locking cams at the top and bottom

❒ Close the door

➥ With a gap of approx. 2 to 3 cm there must be a noticeable resistance

❒ If the resistance is too low or too high, move the locking cams backwards or forwards using an Allen key (32 mm)

➥ The movement of the locking cams causes the hinged plate to move, allowing the contact pressure to be adjusted

➥ Caution: Both locking cams (top and bottom) must be aligned in the same way

❒ Close the door

❒ If the door will not close, move the locking cams forward slightly

➥ Caution: Both locking cams (top and bottom) must be aligned in the same way

❒ Secure the lock nuts again

The locking plate can be moved in the same way using the locking cam at the side of the door handle, allowing the contact pressure to be adjusted on this side

4.3 Emissions measurement by chimney sweep or regulatory body

Various legal regulations stipulate that heating systems must be inspected periodically. In Germany this is regulated by the First Federal Emissions Protection Ordinance (BimSchV) in the last amended version, and in Austria by various state laws. The boiler must always be cleaned 2-3 heating days prior to measurement. It is important to ensure that there is adequate heat consumption on the day of the measurement. (e.g. storage tank must be able to take heat for the duration of the measurement).

4.3.1 Measuring at rated load in firewood mode

❒ Press the service program key
❒ Activate “Chimney-sweep mode” in the quick menu
▪ The boiler runs for 45 minutes at nominal load
- Boiler temperature is set to 85°C
- Heating pumps switch on and the mixer valves open
- Boiler loading is activated
❒ Perform the measurement under the following conditions
↳ Flue gas temperature at approx. 170°C
↳ CO_2 content of the flue gas between 10 and 14%
↳ Boiler temperature above 65°C

4.4 Maintenance agreement / Customer service

NOTICE! We recommend a yearly inspection by Froling customer services or an authorised partner (third party maintenance).

Regular maintenance and servicing by a heating specialist will ensure a long, trouble-free service life for your heating system. It will ensure that your system stays environmentally-friendly and operates efficiently and cost-effectively.
In the course of this maintenance the entire system is inspected and optimised, particularly regulation and control of the boiler. The emission measurement carried out can also be used to draw conclusions about the combustion performance of the boiler.
For this reason, FROLING offers a service agreement, which optimises operating safety. Please see the details in the accompanying guarantee certificate.

Your Froling customer service office will also be happy to advise you.

NOTICE

All national and regional regulations relating to regular testing of the system must be observed. Please be advised that, in Austria, commercial systems with a rated heat output of 50 kW or more must be regularly tested at yearly intervals in accordance with the Heating Plant Regulations (Feuerungsanlagen-Verordnung).

4.5 Replacement parts

With Froling original replacement parts in your boiler, you are using parts that match perfectly. As the parts fit together so well, installation times are shortened and a long service life is maintained.

NOTICE

Installing non-original parts will invalidate the guarantee.

❒ Only replace components or parts with original replacement parts

4.6 Disposal information

4.6.1 Disposal of the ash

❒ The ash should be disposed of in accordance with waste management regulations.

4.6.2 Disposal of system components

❒ Ensure that the system is disposed of in an environmentally friendly way in accordance with waste management regulations.

❒ You can separate and clean recyclable materials and send them to a recycling centre.

❒ The combustion chamber must be disposed of as builders' waste.

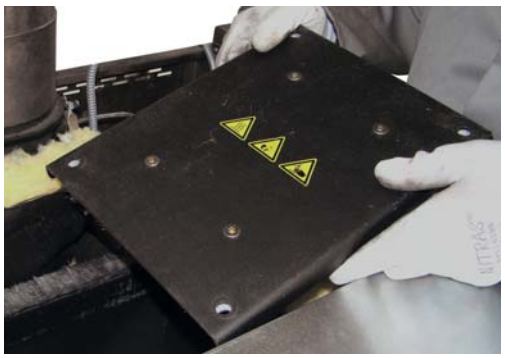
5 Troubleshooting

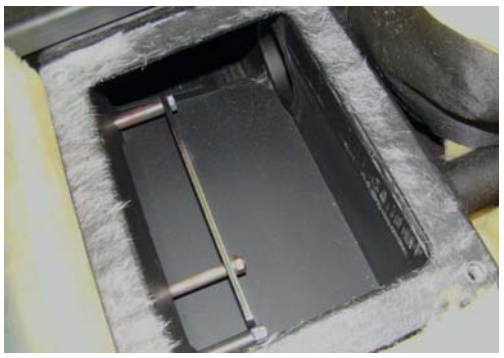
5.1 Carbonisation gas duct flap is stiff

Error characteristics	Possible cause	Elimination of error
Carbonisation gas duct flap is stiff Little or no draught through the combustion chamber when the flap is closed	Flap guide blocked Flap cannot be closed due to dirt and deposits	Check the area under the inspection cover for dirt and deposits and clean if necessary

Clean the carbonisation gas duct flap

❒ Lift off the controller cover and remove the insulating mat beneath it
❒ Unfasten the screws on the inspection cover





❒ Lift off the inspection cover
❒ Clean the carbonisation gas duct flap and flap guides
❒ Clean the entire area using a brush and ash vacuum

5.2 General fault with power supply

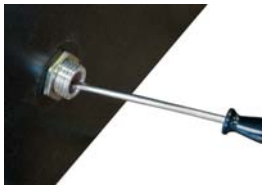
Error characteristics	Cause of error	Elimination of error
Nothing is shown on the display No power to the controller	General power failure Main switch is turned off FI circuit breaker or line protection is switched off Faulty fuse in the controller	 Turn on the main switch Switch on the FI circuit breaker or line protection Replace the fuse – note the amperage (6.3AT)

5.2.1 Behaviour of system after a power failure

When the power supply has been restored, the boiler returns to the previous mode and is controlled according to the specified program.

- ❒ **After a power failure, check whether the STL (high-limit thermostat) has tripped.**
- ❒ **Keep the doors of the boiler closed during and after the power failure, at least until the induced draught fan automatically starts up again.**

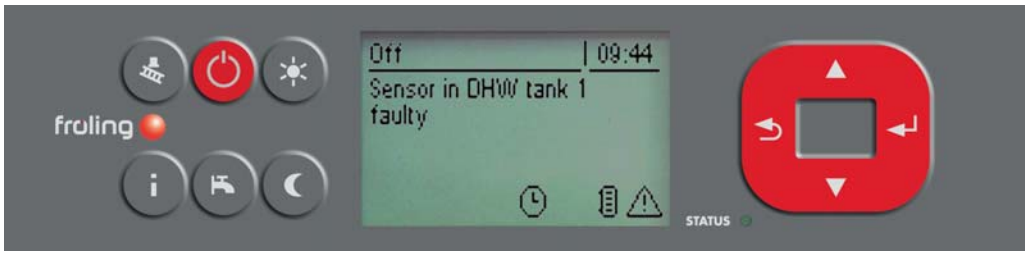
5.3 Excessive temperature



Once the temperature falls below approx. 75°C, the STL (high-limit thermostat) can be reset mechanically:

- ❒ Unscrew the cap on the STL (high-limit thermostat)
- ❒ Unlock the STL (high-limit thermostat) by pressing with a screwdriver

5.4 Faults with fault message



If a fault has occurred and has not yet been cleared:

❒ Status LED indicates the nature of the fault
- Orange flashing: Warning
- Red flashing: Error or alarm

❒ A fault message is shown on the display

5.4.1 Procedure for fault messages

The procedure in the case of a fault message, the causes of faults and procedure for troubleshooting are described in the operating instructions for the boiler controller:

IMPORTANT! See operating instructions for the Lambdatronic S 3200 S1

5.4.2 Acknowledging a fault message

Trace and remove the fault and then:

❒ Press the Enter key

➥ Status LED constant or flashing green (depending on operating status)
- Green constant: Heating
- Green flashing: Off

Trace and remove the fault and then:

❒ Tap the “Cancel” symbol

➥ Status LED constant or flashing green (depending on operating status)
- Green constant: Heating
- Green flashing: Off

6 Appendix

6.1 Addresses

6.1.1 Address of manufacturer

FRÖLING
Heizkessel- und Behälterbau GesmbH

Industriestraße 12
A-4710 Grieskirchen
AUSTRIA

TEL 0043 (0)7248 606 0
FAX 0043 (0)7248 606 600
INTERNET www.froeling.com

6.1.2 Address of the installer

Stamp